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Natural
Resources
Conservation
Service

Supplement to the Soil Survey of Los Angeles County, California, Southeastern Part

National Cooperative Soil Survey

This document was made for the National Cooperative Soil Survey by the United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Santa Monica Mountains Resource Conservation District; the Foundation for Pierce College and Pierce College Farm Center; and the State of California, Department of Conservation. This supplement accompanies the most current official data for the soil survey of Los Angeles County, California, Southeastern Part, available at http://websoilsurvey.nrcs.usda.gov.

Acknowledgement is also given to the many agencies, organization, cities, and school districts who provided access to lands and areas that were essential to making this survey. They include the Army Corps of Engineers, Baldwin Hills Conservancy, Burbank Unified School District, California Coastal Commission, California State Parks, California Polytechnic State University—Pomona, Hacienda La Puente Unified School District, Los Angeles Department of Recreation and Parks, Los Angeles Unified School District, Los Angeles World Airports, Montebello Unified School District, Palos Verdes Land Conservancy, Puente Hills Habitat Preservation Authority, Rivers and Mountains Conservancy, and Santa Monica Mountains Conservancy.

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Major fieldwork for this soil survey was completed in 2016. Soil names and descriptions were approved in 2016. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2016.

Literature Citation

The correct citation for this survey is as follows:

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Cover Caption

The Los Angeles metropolitan area, as seen looking south from Verdugo Mountain, near Glendale, California. Downtown Los Angeles is in the center of the photo, and the Palos Verdes Peninsula is in the distance.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov/.

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Preface

This document is intended to provide supplemental information about the survey of the Los Angeles County, California, Southeastern Part, that is not provided in the Web Soil Survey SSURGO data.

This supplement and the online soil survey data provide information that affects land use planning in this survey area. They are intended for many different users. Farmers, ranchers, foresters, and agronomists can use the information to evaluate the potential of the soil and the management needed for maximum food and fiber production. The information can be used by planners, community officials, engineers, developers, builders, and home buyers to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. It can also be used by conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control to help them understand, protect, and enhance the environment.

Location of Los Angeles County, California, Southeastern Part

Supplement to the Soil Survey of Los Angeles County, California, Southeastern Part

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This document was developed to support and supplement the data for the soil survey of Los Angeles County, Southeastern Part. The data and maps for this soil survey have been previously published for the Soil Survey Geographic Database (SSURGO) via the Web Soil Survey online application. Spatial and tabular reports, including tables, interpretations, detailed map unit descriptions, and maps, can be accessed using the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov).

This document provides information not available through Web Soil Survey. It contains narrative descriptions of the physiography, geology, relief, climate, drainage, and formation of the soils in the survey area and includes applications of the soil survey for the urban environment. In addition, it provides the taxonomic descriptions of the soils along with photographs of soil profiles and landscapes.

Completion of this soil survey provides continuous soil mapping coverage in Los Angeles County. It joins the soil surveys of Santa Monica Mountains National Recreational Area; Los Angeles County, West San Fernando Valley Area; Angeles National Forest Area; San Bernardino County, Southwestern Part; and Orange County and Western Part of Riverside County.

General Nature of the Survey Area

This section provides general information about the physiography, relief, and drainage; major land resource areas; history and development; and climate of the survey area.

Physiography, Relief, and Drainage

The survey area is a portion of the Lower California Province and part of an extensive sequence of coastal plain, alluvial plain, and coastal valleys that are surrounded by several hills, mountains to the north and east, and the Pacific Ocean to the southwest. See physiographic location map included with this document.

Los Angeles is located in a complex geologic position (fig. 1), where several mountain ranges and hill systems converge. An extensive network of alluvial fans extends from these mountains and hills and eventually terminates at the Pacific Ocean coastline in the Los Angeles Coastal Plain (part of the Southern California Coastal Plain, or NRCS Major Land Resource Area 19). The mountains to the north of Los Angeles are part of the east-west-oriented Transverse Range. The San Gabriel

Figure 1.—The Los Angeles Basin. Photo taken looking north from the Palos Verdes Peninsula.

Mountains are the highest points in the local area and are mostly granitic in nature. Mount Wilson, near Pasadena, has an elevation of 5,712 feet, and Mount San Antonio, approximately 38 miles northeast of downtown Los Angeles, has an elevation of 10,069 feet.

The Santa Monica Mountains border the Los Angeles area to the north and extend west through Malibu until they terminate at the southeastern margin of the Oxnard Plain in Ventura County. Slopes range from 20 to 75 percent in this area. The bedrock in these mountains is highly variable. An exposure of the basement granitic rocks occurs on the southeastern part of Griffith Park. Another large exposure of granitic rock occurs north of the West Hollywood area. Pockets of sedimentary rocks (noncalcareous Topanga Formation) with interlayered basalt overlie the granite (Yerkes and Campbell, 2005). Heading west from Beverly Hills and into Santa Monica, the Santa Monica Slate formation dominates the southern margin of the Santa Monica Mountains.

Marine sedimentary formations make up the Elysian, Repetto, Montebello, San Jose, and Puente Hills. These hills are late Miocene and early Pliocene in age (Yerkes and Campbell, 2005). They have slopes ranging from 20 to 75 percent. Shells can be found throughout these hills, and most areas have calcareous soils. These hills extend northwest to southeast, from just below Griffith Park to the Puente Hills, and terminate at the Santa Ana Mountains of the Peninsular Range. They also loosely separate the coastal plain deposits from the alluvial plain and coastal valleys that are upslope from the coastal plain. The marine sedimentary formations include various phases of the Puente and Fernando Formations that are dominated by calcareous siltstone and shale with noncalcareous sandstone scattered intermittently throughout the area. These sedimentary hills are smooth and rolling and have steep side slopes ranging from 35 to 85 percent.

Broad remnant alluvial fans are scattered throughout the Los Angeles Basin in positions protected from erosional processes by hills and/or incised stream channels (fig. 2). Slopes are typically 0 to 9 percent, but some areas have slopes up to 15 percent. These broad remnant fans are typically oriented northeast to southwest behind hills where stream flow was diverted. They occur in slightly elevated positions that are visibly higher than the surrounding flood plain. Most of the fans are weathered

from granitic materials of the San Gabriel Mountains and the Santa Monica Mountains. An exception is the remnant alluvial fans in Santa Monica, Brentwood, Westwood, Beverly Hills, and Cheviot Hills that weathered from the Santa Monica Slate. The fans with slate origin are highly dissected where high-energy stream channels exit the Santa Monica Mountains and eventually drain through Ballona Creek in Marina Del Rey.

A low-lying hill system extends from the City of Long Beach, north through Signal Hill, Dominguez Hills in Carson, and Inglewood into the Baldwin Hills in Culver City. Slopes are typically 0 to 9 percent; in the Baldwin Hills, they are 20 to 55 percent. This landscape resulted from uplift of alluvium along with the San Pedro and Inglewood Formations in the Baldwin Hills by the Newport-Inglewood Fault. These hills contain active oil fields. The material is Pleistocene in age (Yerkes and Campbell, 2005), and areas have soils with highly weathered argillic horizons as well as pockets of high clay, high shrink-swell soils (deposited in pre-uplifted positions). The Baldwin Hills section has less clay than the remaining uplifted area with minimal soil development and are typically weathered from the noncalcareous San Pedro Formation.

Holocene-age alluvium covers an extensive portion of the Los Angeles Basin. Slopes range from 0 to 5 percent and are typically less than 2 percent. This area has three watersheds: the Los Angeles River, which flows south to the Port of Long Beach; the San Gabriel River, which flows to Alamitos Bay; and Ballona Creek, which flows southwest from the Elysian Hills and West Hollywood via the Santa Monica Mountains and discharges through Marina Del Rey.

The alluvial fans located north of the marine sedimentary hills lack calcium carbonate. They occur in a coalescing fan system that originated from the granite and diorite in the San Gabriel Mountains, Verdugo Mountains, and San Rafael Hills. The deposition includes young and weakly developed, coarse textured alluvial soils found in the eastern San Fernando, La Crescenta, San Gabriel, and Pomona Valleys. The soils have a high content of rock fragments near the canyon openings, and rock fragment content decreases as distance from the mountains increases.

Figure 2.—Alluvial fans in the Crescenta Valley between the Verdugo and San Gabriel Mountains. Photo taken from the Verdugo Mountains, looking east into La Crescenta-Montrose and La Canada-Flintridge in the valley.

South of the marine sedimentary hills, the broad coastal plain generally consists of weakly developed coarse soils that contain low or moderate concentrations of calcium carbonate. Soils of the Los Angeles and San Gabriel flood plain are generally coarse with minimal profile development. They are commonly stratified in the subsurface due to regular flooding events prior to concrete channelization and sealing of the rivers and creeks. Soils in dips and low-lying positions on the flood plain were historically wet before the water table was lowered by drainage.

High clay soils, some of which have a high shrink-swell potential, also occur in bottoms of ephemeral stream erosional channels carved through alluvial fan remnants or along the base of alluvial fan aprons weathered from sedimentary hills. Somewhat poorly drained loamy soils that were drained occur backed up against hills and uplifted landforms. They are most notable in two areas: an area to the north of the Puente Hills and the lowland area called La Cienega (“The Swamp” in Spanish), which begins in West Hollywood and continues southeast along the eastern side of the Newport-Inglewood uplifted alluvium and into Long Beach. The drained wetland that parallels present-day La Cienega Boulevard has a long, relatively consistent band of dark, fine-loamy soils that have stratified sands in the subsurface. These soils are characterized by the Biscailuz series. Moving west into the Ballona Creek watershed, most of the young alluvial soils are loamy, appear to have a regular decrease in organic carbon, and have minimal profile development. Most of the historically wet soils have been drained.

An extensive late-Pleistocene-age sand dune field (Yerkes and Campbell, 2005) exists parallel to the coastline north of the Palos Verdes Peninsula and extends through Westchester. It is known as the El Segundo Sand Dunes. In addition, a remnant pocket of old dunes occurs in the Ocean Park area of Santa Monica (Thomas et al., 1961). Dune features can be observed as far as 3.5 to 4 miles (about 6 kilometers) inland from the coast. A narrow band of young Holocene-age, actively reworked dunes occurs between the existing old dunes and the current beaches. Slopes range from 0 to 15 percent in the stabilized dunes and are up to 30 percent in the actively reworked dunes bordering the beach.

The El Segundo Sand Dunes overlie a late- to middle-Pleistocene-age, low-lying, alluvial bottomland landscape that is confined to the east by the uplifted alluvium from the Newport-Ingelwood Fault at the eastern margin of the sand dunes. Slopes are typically 0 to 2 percent. These alluvial deposits have a high content of clay and are mostly homogenous in texture. They are represented by the Centinela and Cropley series. A water table is observed in dips or depressions and near the Dominguez Creek flood plain. A series of subtle stream terraces with weathered soils are along the western edge of the uplifted alluvium to the east.

The Palos Verdes Peninsula, located west of Long Beach, is associated with the north-south-oriented uplift from the Peninsular Range (Bilodeau et al., 2007). Slopes range from 5 to 15 percent on the marine terraces and 10 to 75 percent on the side slopes. Large landslides occur on steep slopes, and they are most expansive in the Portuguese Bend slide area on the southwest side of the pennisula. Large slump blocks are visible throughout the peninsula on steep slopes. Catalina Schist is exposed on Palos Verdes and on Santa Catalina Island, located 40 miles offshore (Woodring et al., 1946). This is the only exposure of Catalina Schist on the mainland.

The most extensive sequence of marine terraces in the Los Angeles area is preserved in the Palos Verdes Hills and in the Malibu-Pacific Palisades region (Bilodeau et al., 2007). Thirteen marine terraces in this area are visible, and some areas are more than 100 feet high. The bedrock on the peninsula primarily consists of Altamira Shale with pockets of diatomaceous shale and outcroppings of basalt or andesite on marine terrace risers.

Figure 3.—A typical urban landscape in MLRA 19—Southern California Coastal Plain. Photo taken looking north from the Baldwin Hills Scenic Overlook.

Major Land Resource Areas

The United States Department of Agriculture (USDA) Handbook 296, "Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin," provides a basis for making decisions about national and regional agricultural concerns, identifies needs for research and resource inventories, provides a broad base for extrapolating the results of research within national boundaries, and serves as a framework for organizing and operating soil surveys and resource conservation programs.

Major land resource areas (MLRAs) are geographically associated land resource units. Land resource regions are groups of geographically associated major land resource areas. Identification of these large areas is important in statewide agricultural planning and also valuable in interstate, regional, and national planning. The MLRAs within the survey area are MLRA 19—Southern California Coastal Plain and MLRA 20—Southern California Mountains.

MLRA 19—Southern California Coastal Plain

This MLRA includes the San Fernando, Crescenta, San Gabriel, Pomona, and San Jose Valleys and the Los Angeles Coastal Plain. Almost all of it consists of high-density residential development and commercial areas (fig. 3). Small areas are reserved as park land, open space, or vacant lots. Within the southeastern part of Los Angeles County, MLRA 19 includes a sequence of broad alluvial fans and flood plains with mixed alluvium that originates from the San Gabriel Mountains and extends across the coastal plain approaching the Pacific Ocean.

Natural vegetation was perennial or annual grasses, oaks, shrubs, and forbs. Today, most of the vegetation is ornamental lawns, trees, shrubs, or xeriscapes (landscaping that conserves water).

Elevation ranges from sea level to about 715 meters (approximately 2,350 feet) where the San Gabriel foothills abruptly rise from the alluvial plain. The mean annual precipitation ranges from 305 to 490 millimeters. The mean annual temperature ranges

from 17 to 19.6 degrees C. The frost-free period is 360 to 365 days near the coast and 350 to 365 days inland.

MLRA 20—Southern California Mountains

This MLRA includes the Puente, San Jose, Repetto, Montebello, Elysian, and San Rafael Hills; the Santa Monica, Verdugo, and San Gabriel Mountains; and Palos Verdes Peninsula. The hills and mountains are scattered throughout the survey area. There is extensive urban development on the rolling hills and foothills of the mountains. Most of the hills have extensive human-transported materials from cut and filled hillslopes, where terraces were created for residential and commercial construction. Steep or unstable slopes that are not suitable for urban development remain intact and are commonly used as nature preserves and conservation corridors or provide recreational trail networks.

Bedrock is dominantly granite in the San Gabriel Mountains and eastern part of the Santa Monica Mountains at Griffith Park. It is mainly diorite in the Verdugo Mountains and San Rafael Hills. Weathered marine calcareous sedimentary siltstone and shale are typical in the Puente, San Jose, Repetto, Merced, and Elysian Hills. These hills have pockets of noncalcareous sandstone. Most of the Palos Verdes Peninsula is part of the Altamira Shale formation, which has high a concentration of calcium carbonate and is indurated.

Vegetation is dense chaparral with sagebrush, laurel sumac, annual and perennial grasses, mustard, ceanothus, chamise, milkweed, poison oak, and coyote bush. South-facing slopes typically are grassy with brush, while north-facing slopes commonly have dense shrubby vegetation with oaks.

Elevation ranges from about 1 to 1,000 meters (approximately 3,300 feet). The mean annual precipitation ranges from about 357 to 778 millimeters on the interior hills or mountains and from 280 to 444 millimeters on the Palos Verdes Peninsula. The mean annual temperature is about 17 to 19.3 degrees C in the interior hills or mountains and 17 to 18 degrees C on Palos Verdes Peninsula, which has a moderated coastal climate. The frost-free period is about 320 to 365 days inland and 360 to 365 days on Palos Verdes Peninsula.

History and Development

Sources for this section include: “History of Los Angeles” (City of Los Angeles, 2017); “Historical Timeline of Los Angeles” (Discover Los Angeles, 2016); “Glory Days of the Los Angeles River” (Simpson, 2012a); “Los Angeles Agriculture, from Cows to Concrete: A History of Los Angeles Agriculture” (University of California, 2010); “Los Angeles Flood of 1938: Cementing the River’s Future” (Simpson, 2012b); “Los Angeles Flood of 1938: The Destruction Begins” (Simpson, 2012c); “Historical Ecology and Landscape Change of the San Gabriel River and Floodplain” (Stein et al., 2007); and “History of Los Angeles” (Wikipedia, 2017).

The Los Angeles area has been distinctly influenced by the development of urban soils. This area has been inhabited by Native Americans since approximately 8,000 B.C. Spanish explorers visited the California coastline in 1542 and made contact with the native people on an excursion in 1602. The Spanish did not return to the Los Angeles area until 1769, when they established a land route to the port of Monterrey. In 1771, the Mission San Gabriel Arcángel was established by Father Junipero Serra. It was moved from the City of Montebello to the present-day City of San Gabriel and can be visited today. In 1781, eleven families established the original settlement in Los Angeles. The settlement consisted of 48 people, including 4 soldiers from Mexico. These settlers were known as the Los Angeles Pabladores.

In 1769, Spanish explorer Juan Crespi stated, “After crossing the river we entered a large vineyard of wild grapes and an infinity of rosebushes in full bloom. All the soil is black and loamy, and is capable of producing every kind of grain and fruit which may be planted. We went west, continually over good land well covered with grass.”

The survey area was under Spanish rule until 1821, when Mexico separated from Spain. It remained under Mexican rule until 1847, after the Battle of Rio San Gabriel during the Mexican-American War. The United States took control of Los Angeles by signing of the Treaty of Cahuenga in present-day Universal City. In 1848, with the Treaty of Guadalupe Hidalgo, California formally ceded and became part of the United States.

During the early settlement period in the Los Angeles area, ranching was the primary agricultural system along with grain farming. During the Gold Rush years in the 1840s and 1850s, Los Angeles County was referred to as “Queen of the Cow Counties.” Following the drought of 1860 to 1862, irrigated farm crops became more popular. In 1873, seedless navel oranges were introduced to the area from Brazil. In the 1880s, there was a rapid transition from ranching and grain production to irrigated citrus, fruit, vegetables, and vineyards.

In 1913, the Los Angeles Aqueduct opened. It provided water from the Owens River in the eastern Sierras and allowed increased production of higher dollar, irrigated crops while meeting the demands of the growing urban population. Agriculture remained prominent in the Los Angeles area until intense urban development overtook the farming community. Farming was prevalent through the housing boom following World War II but was greatly reduced by the 1960s. Today, very little land is used for agriculture outside of the university research farm, small residential plots, and small-scale community gardening and urban agriculture efforts.

The flooding of the Los Angeles and San Gabriel Rivers has greatly shaped the historical development of the Los Angeles area. Historically, both rivers have had shifting paths with rarely defined stream channels. The broad flood plains commonly shifted after high-intensity storms, and most of the flows dispersed or infiltrated into the ground prior to reaching the ocean. As a result of major flooding events, such as the flood of 1835, the flow of the Los Angeles River was diverted from Ballona Creek, which discharged into Santa Monica Bay at Marina Del Rey, to its current path south into San Pedro Bay in Long Beach. In 1835, the San Gabriel River flowed through the path of the Rio Hondo, merged with the Los Angeles River, and flowed through Long Beach to Sand Pedro Bay. In 1867, a large flooding event cut a channel through the Whittier Narrows and the San Gabriel River’s diverted flow more closely resembled its current path to Alamitos Bay. As the population continued to grow, the unpredictable nature of these flooding events destroyed infrastructure and homes and devastated crops. Catastrophic floods in 1914, 1934, and 1938 prompted construction of a series of dams, stream channelization, and concrete sealing, which created the current engineered stream channels. The construction of the modern, concrete-sealed channel for the Los Angeles River took place between 1938 and 1960.

The San Gabriel River was channelized and sealed with concrete starting in the 1950s. Five dams have been built along the San Gabriel River, and debris spreading grounds and infiltration basins have been established to substantially reduce the volume of water flowing down the channel during high-rainfall events. These engineered structures are greatly depended upon to protect the urban development spreading onto the flood plains.

After the 1950s, the filming, music, aerospace, shipping, and automotive industries and a booming real estate market produced a robust economy. The economy, in combination with the cultural influence and recreational opportunities, continued to attracted people into the Los Angeles area. Urban development increased, and now a sprawling suburban landscape covers most of the land within the boundaries of the mountains. The historical flood plains have been built up to the edge of the concrete river and stream channels. The development extends over the upland plains and onto hillsides and foothills of the mountains. The remaining open spaces are fragmented into public parks, nature preserves, or land conservancies or are areas too steep or unstable to support development. The urban environment has overtaken the natural

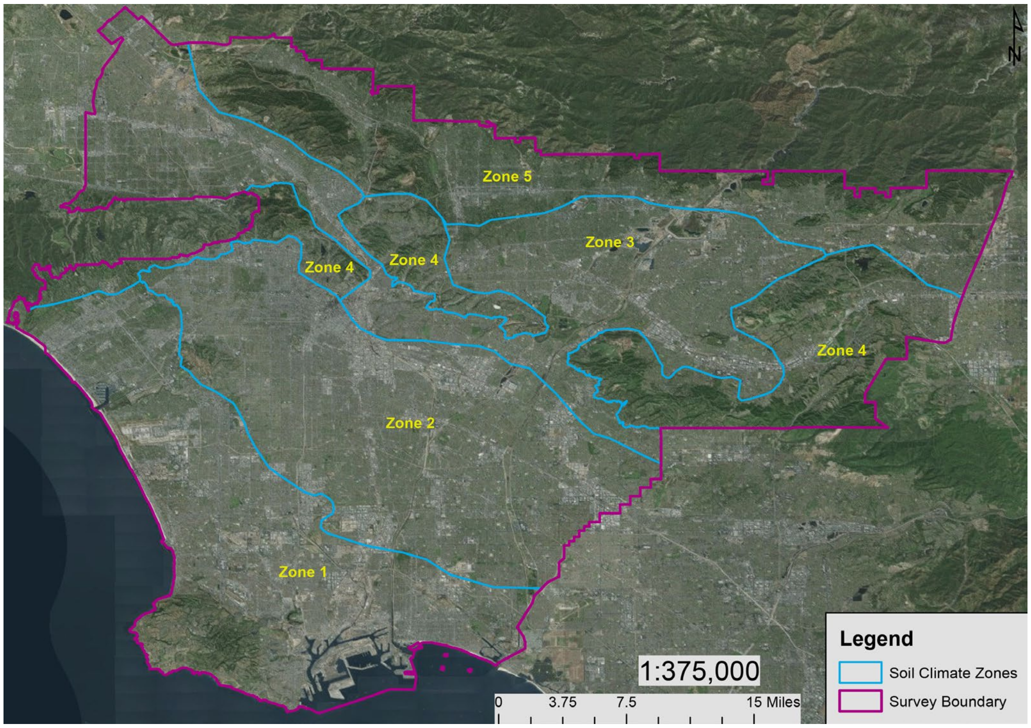


Figure 4.—Soil climate zones of Los Angeles County, California, Southeastern Part.

landscape in this part of Los Angeles County, the most populated county in the United States.

Climate

The survey area is divided into soil climate zones (Soil Survey Division Staff, 2017), shown in figure 4. The zones are used to represent the temperature and precipitation gradients of the area and do not delineate exact boundaries. See the appendix for a summary of temperature and precipitation data by soil climate zones. Tables 1 and 2 provide monthly averages for temperature and precipitation near downtown Los Angeles (Western Regional Climate Center, 2016).

The Los Angeles area has a Mediterranean climate, characterized by warm, dry summers and cool, moist winters. Most of the annual rainfall occurs between November or December and April or May. Microclimatic variation is common. Slightly cooler and drier conditions occur at or near the coast. The coastal areas, identified as soil climate zone 1 on the map, have a narrower range of summer and winter temperatures due to the moderating effect of the ocean. Precipitation tends to increase as distance from the San Gabriel Mountains decreases and as elevation increases, as seen in soil climate zone 5. Snowfall typically does not occur in the survey area, except in very rare and extreme weather events. Snow is visible in the San Gabriel Mountains during winter at the higher elevations outside the survey area.

The mean annual temperature near downtown Los Angeles is about 18.3 degrees C (65 degrees F), which is central to the temperature range in the Los Angeles Basin, in soil climate zone 2. In a narrow, ocean-buffered band along the coast, in soil climate zone 1, the temperature averages 17.8 degrees C (64 degrees F). Portions of the San Gabriel and San Fernando Valleys, in soil climate zone 3, average 19 degrees C (66 degrees F). Differences in temperature throughout the survey area are subtle but, in general, the cooler temperatures are along the coast in areas with marine fog and

Table 1.—Temperature

(Recorded in the period 1906 to 2012 at Downtown USC Campus, Los Angeles, California 045115)

Month*	Monthly averages (degrees F)			Maximum temperature		Minimum temperature	
				Number of days		Number of days	
	Maximum	Minimum	Mean	>= 90 degrees F	<= 32 degrees F	>= 90 degrees F	<= 32 degrees F
January--	66.4	48.3	57.3	0.1	0.0	0.1	0.0
February-	67.3	49.5	58.4	0.1	0.0	0.0	0.0
March----	68.8	51.1	60.0	0.2	0.0	0.0	0.0
April----	71.0	53.5	62.2	0.8	0.0	0.0	0.0
May------	72.9	56.5	64.7	0.8	0.0	0.0	0.0
June-----	76.9	59.7	68.3	1.2	0.0	0.0	0.0
July-----	82.3	63.2	72.7	3.1	0.0	0.0	0.0
August---	83.1	63.8	73.4	4.1	0.0	0.0	0.0
September	81.9	62.6	72.3	4.9	0.0	0.0	0.0
October--	77.6	58.7	68.1	3.1	0.0	0.0	0.0
November-	72.8	53.3	63.0	0.8	0.0	0.0	0.0
December-	67.4	49.1	58.2	0.0	0.0	0.0	0.0
Averages:							
Annual--	74.0	55.8	64.9	19.5	0.0	0.1	0.0
Winter--	67.0	49.0	58.0	0.2	0.0	0.1	0.0
Spring--	70.9	53.7	62.3	1.9	0.0	0.0	0.0
Summer--	80.8	62.2	71.5	8.5	0.0	0.0	0.0
Fall----	77.4	58.2	67.8	8.8	0.0	0.0	0.0

* Winter = December, January, February; Spring = March, April, May; Summer = June, July, August; Fall = September, October, November.

Table 2.—Precipitation

(Recorded in the period 1906 to 2012 at Downtown USC Campus, Los Angeles, California 045115)

Month*	Mean (inches)	High Amount (inches)	High Year	Low Amount (inches)	Low Year	1-day maximum Amount (inches)	1-day maximum Date
January--	3.20	14.94	1969	0.0	1948	5.71	01/26/1956
February-	3.38	13.68	1998	0.0	1912	4.80	02/24/1913
March----	2.40	8.37	1983	0.0	1931	5.88	03/04/1938
April----	1.01	7.53	1926	0.0	1909	2.74	04/05/1926
May------	0.25	3.57	1921	0.0	1923	2.02	05/08/1977
June-----	0.06	0.98	1999	0.0	1908	0.76	06/05/1993
July-----	0.01	0.18	1986	0.0	1907	0.00	07/25/1906
August---	0.05	2.26	1977	0.0	1907	2.06	08/17/1977
September	0.27	5.67	1939	0.0	1907	3.96	09/25/1939
October--	0.48	4.56	2004	0.0	1913	1.72	10/17/1934
November-	1.25	9.68	1965	0.0	1907	3.85	11/07/1966
December-	2.41	10.23	2010	0.0	1912	5.55	12/28/2004
Averages:							
Annual--	14.77	34.04	1983	3.85	1953	5.88	03/02/1938
Winter--	8.99	29.11	2005	1.19	1924	5.71	01/26/1956
Spring--	3.66	13.89	1983	0.0	1997	5.88	03/02/1938
Summer--	0.12	2.26	1977	0.0	1912	2.06	08/17/1977
Fall----	2.0	11.48	1965	0.0	1980	3.96	09/25/1939

* Winter = December, January, February; Spring = March, April, May; Summer = June, July, August; Fall = September, October, November.

the slightly warmer temperatures are further inland. The frost-free period is typically 359 to 365 days, except at the higher elevations in the mountains and foothills, areas which can have as few as 340 frost-free days. Frost occurs for short periods with low overnight temperatures and does not occur every year.

Rainfall is lowest in the coastal areas, in soil climate zone 1, where it averages 331 mm (13 inches) and ranges from 306 to 391 mm (12 to 15.5 inches). Precipitation increases heading inland or as elevation increases. Further inland, in the area of the Los Angeles coastal plain south and west of the hills connecting the Puente Hills to Elysian Park, in soil climate zone 2, rainfall averages 360 mm (14 inches) and ranges from 308 to 458 mm (12 to 18 inches). In the alluvial plain north and east of these hills and in the San Fernando Valley, in soil climate zone 3, rainfall averages 435 mm (17 inches) and ranges from 380 to 490 mm (15 to 19 inches). Rainfall is generally higher in the hills and mountains compared to the adjacent coastal or alluvial plain. In the Puente, San Jose, Montebello, Repetto, and Elysian Hills, in soil climate zone 4, rainfall averages 448 mm (17.5 inches) and ranges from 398 to 483 mm (15.5. to 19 inches). In the San Rafael Hills and Verdugo Mountains, Crescenta Valley, and foothill area of the San Gabriel Mountains, in soil climate zone 5, rainfall is the highest, with mean annual of 541 mm (21 inches) and a range of 452 to 668 mm (17.5 to 26 inches). North of the survey area in the San Gabriel Mountains, near Mount Wilson and Mount Baldy, rainfall totals increase to as much as 1,000 to 1,300 mm (39 to 51 inches).

Urban Use of Soils

Sources for this section include: “Historical Timeline of Los Angeles” (Discover Los Angeles, 2016); “Historical Ecology and Landscape Change of the San Gabriel River and Floodplain” (Stein et al., 2007); and “History of Los Angeles” (Wikipedia, 2017).

The soils of the Los Angeles area were mainly used for small ranching and farming enterprises until the completion of the Southern Pacific Railroad in 1885. As rangelands were converted to the production of grain, fruit, vegetable crops, and vineyards, careful soil management became important. The citrus industry boomed, and the railroad brought an influx of people into the area. By 1900, the population reached 102,500, and by 1924, it had jumped to 1 million. Soils became used more frequently for urban applications than agricultural.

Los Angeles remained largely agricultural until the post-World War II housing boom, which took over most of the agriculture sector by the 1960s. At this time, developers purchased large properties and subdivided them for high-density residential development. Soil interpretations for engineering and environmental management became increasingly more important than strictly plant growth considerations. Most interpretations of soils in the urban setting address building site development, construction materials, recreational development, sanitary facilities, waste management, and stormwater management.

The Los Angeles Aqueduct, which was completed in 1913, provided additional water to support rapid and sprawling development. By that time, the demand for water exceeded the supply that the Los Angeles River could support, which was estimated to be enough for 250,000 people. Pumping from the river lowered the ground-water table and reduced the flows in the river channel. Future efforts to channelize and line the river channel with concrete reduced the ground-water recharge potential, which helped to further lower the ground-water table. As a result, many of the historical wetlands and sloughs drained and dried up. The drained lands and the reduced hazard of flooding provided additional sites for future development and expansion of the city. The aqueduct system effectively supplemented the deficient supply of local ground water. Soils that were considered wet in natural conditions are now protected from flooding and the influences of a high water table.

Current mapping of soils in the Los Angeles Basin reflects the overall alteration of the landscape hydrology. It represents the extent of important soil properties at the time the mapping was completed. A significant acreage of urban development in the survey area is on alluvial plains and coastal plains that have slight or negligible slopes. Particularly in sprawling residential neighborhoods, the surface of soils typically has been modified to support site development, including foundations for residential or commercial development, terraces, lawns, community gardens, infrastructure, and various green spaces that support ecological services. Most of the survey area has an intact native soil below surface modifications. The natural soil surface is commonly scraped off prior to amendments, and the truncated native subsoil remains below the transported material. Thickness of the human-transported materials (amended soils) varies but is generally less than 50 centimeters in areas with slopes of less than 5 percent, especially in lawns and other green spaces. Landscapes with slightly higher slopes require more intense soil modification to prepare and level for construction.

Locations with multiple generations of development, commercial, and industrial lands near city centers, such as downtown Los Angeles, have higher spatial extent of human-transported materials. In these areas, the native soils are generally covered with human-transported materials to a depth of 1 to 2 meters or have been completely altered. Construction debris is common in areas with multiple generations of development.

The age of the residential areas is commonly reflected in the degree of soil landscape alteration. More recent residential projects have extensive alteration where large areas have been scraped, graded, and reshaped by the movement and transport of soil materials. In somewhat older neighborhoods, the foundations and infrastructure have been placed within the landscape without extensive regrading. As a result, many soils in backyards and parks, except in areas of hills, retain much of their natural character and properties.

Development of the hillsides and foothills of the mountains is common in Los Angeles County (fig. 5). On the marine sedimentary hills, soils are weakly developed, have a high shrink-swell potential, have a high content of clay, and have soft bedrock. Although the slopes have a rolling appearance, side slopes can exceed 55 to 75 percent and the soils on soft bedrock are unstable. This combination of soil properties presents challenges to engineers designing housing. Other hillside development areas, such as those on the granitic foothills of the San Gabriel Mountains, Verdugo Mountains, and San Rafael Hills, have issues such as excessive slopes and loose and poorly consolidated soils. Storm damage to early development in these areas prompted the city and county to reform construction practices on hillsides.

In 1952, Los Angeles became the first city to pass a hillside grading ordinance, which received major revisions in 1963 (Scullin, 1983). Later, the county and many surrounding cities passed grading ordinances of their own. Prior to these ordinances, homesites had a lesser amount and extent of human-transported materials. Natural slopes and native soils commonly are located between the cut-and-fill hillslope terraces. Following implementation of the practices described in the ordinance, the developers adopted methods to reshape the entire hillside and provide an almost completely engineered landscape. There are specifications for maximum slope of terraces, compaction standards, road grading standards, etc. The transported materials used during the construction of these hillside terraces typically have rock fragments that were detached from *in situ* bedrock and mixed into the soil profile by excavation equipment. These engineered landscapes are visible in the more recent development in the suburban communities.

One current focus in the Los Angeles area is on improving the ecological services provided by urban soils. Flood-plain enhancement, green infrastructure, and greenways all help city planners to better manage water resources, improve water quality, and increase the recharge potential for the local aquifers. Capturing surface

Figure 5.—Residential hillside development near downtown Los Angeles.

water, increasing infiltration, and using available water resources are critical for the future. Efforts are underway to enhance the flood plains of the Los Angeles River, the San Gabriel River, and Ballona Creek so that storm water is captured and filtered before it reaches the ocean, the ground-water recharge potential is increased, and riparian habitat is improved. They include restoring parts of the flood plain and re-establishing historical riparian zones and freshwater marsh habitat.

How This Survey Was Made

The soil survey of Los Angeles County, California, Southeastern Part was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses.

Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

In urban areas, soil scientists examined soil profiles at city parks, schoolyards, vacant lots, construction trenches, and residential or commercial yards. In the hills and mountains, nature preserves, nature conservancies, city parks, and various open spaces also provided accessible locations to document the soil properties.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the

area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, human-transported materials, artifacts, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil Taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modification in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey area. This survey represents current soil conditions at the time it was mapped.

Soil Mapping in the Urban Environment

This section is based on information in "Urban Soil Mapping Through the United States National Cooperative Soil Survey" (Hernandez et al., 2017).

Mapping soils in an extensive urban environment, such as Los Angeles, can pose challenges not common to mapping in a natural setting. Natural soils are intermixed with variable depths of human-transported materials without regard to natural landscape position or landforms. This creates highly variable soil properties across an otherwise predictable soil-landform relationship. Anthropogenic soils, which commonly include human-transported materials, make up additional components in map units of densely populated areas. Human-altered/human-transported (HAHT) materials are recognized on identifiable, anthropogenic landforms.

The geodatabase for this survey was developed using a variety of digital reference materials in addition to direct observations in the field. With a geographic information system (GIS), a 3-meter LIDAR (Light Detection and Ranging) dataset mostly was used for terrain analysis. This 3-meter digital elevation model (DEM) was processed into various hillshade, contour, and slope maps. An older 10-meter USGS topo map, also processed using terrain analysis, was used to help identify and confirm anthropogenic surface modification. By comparing the two types of maps, a better understanding of the land use history was achieved. Anthropogenic soils can be visually identified in many areas using high-resolution elevation data, such as the 3-meter DEM. There are geomorphic surface features (shapes) that can be used to identify areas where HAHT materials are suspected.

Reference materials, such as the USGS geology quad maps, were georeferenced and draped over the terrain models (hillshade, etc). A set of old reconnaissance soil surveys completed by the Bureau of Soils between 1916 and 1919 were also used. These historical documents were helpful in identifying natural landforms and provided generalized descriptions of soil properties observed in the pre-developed environment. Other resources included research papers, planning maps, and interviews with people familiar with the history of the area.

The landform mapping model was emphasized to capture the natural landscape units. It can be used even in dense urban environments. In places where mass grading has overtaken the landscape and no historical evidence indicates where the natural landform ends or begins, landform delineations were drawn at the boundary of reshaped landforms. All available reference materials were used to delineate the landforms properly.

After delineating the natural landforms, subset map unit polygons were linked to anthropogenic landforms, where they occur. This technique was used in areas where identifiable and repeatable anthropogenic landforms occur on the landscapes as independent landforms. The rules for delineating anthropogenic landforms are the same as those for delineating natural areas. For example, hillsides that have been leveled and sub-terraced for building or recreational purposes were delineated as a new anthropogenic landform since they differ from the adjacent naturally occurring landform. In this case, the anthropogenic landforms (hillslope terraces) were identifiable and the soils are dissimilar to the natural soils. In rare cases, land use patterns were used to delineate highly disturbed or impervious areas, such as dumps, mines, large oil refineries, tank farms, debris basins, seaports, and large commercial areas. These areas are exceptions to the landform mapping standard. Individual, small-acreage lots or parklands were not delineated at this mapping scale but were included in the greater map unit concepts.

Field data collection in the Los Angeles area was primarily in city parks, golf courses, airports, construction sites, and natural lands. After the soil-landscape model was properly developed, the soil type was projected into adjacent areas on common

landforms where field data could not be collected. Soil descriptions were taken at locations where access was negotiated. This largely prevented traditional transect data from being collected due to unpredictable city park locations and other accessible lands.

Throughout the survey area, HAHT soils were found to be irregularly and unpredictably distributed. Impacted soils commonly exhibit hydrophobic soil surfaces, surface crust formation, and high bulk densities that restrict infiltration rates (Craul, 1999). However, a research study in Baltimore found that although bulk densities were elevated in HAHT soils, only 10 percent of sampled sites were root restrictive due to compaction (Pouyat et al., 2007). Most residential and commercial areas in the Los Angeles area have a thin layer of compacted HAHT materials overlying the natural soil. In many cases, the surface material was locally graded to smooth localized topography and capped with a thin layer of topsoil and/or sod. The HAHT materials in these areas are commonly thin and may be similar to the natural material. Documented bulk densities were higher than those expected for natural material; however, most surface horizons were not root restrictive, a fact consistent with Pouyat's findings in Baltimore. Areas with more substantial modification are generally more isolated or are recognizable on an anthropogenic landform. For example, prior-generation construction sites may not be visible today, but old foundations, cut/fill areas, and leveled areas contain soil in a modified state.

Higher sloping lands have more visible anthropogenic landform features. Large areas are graded to create level or more functional sites for construction and recreation. HAHT materials in these areas tend to be thicker and are more predictable to locate. Examples are large ballfields that are leveled on low-elevation hills or cut-and-filled hillslope terraces on steep side slopes in residential areas.

Soils that have HAHT materials to a depth greater than 50 cm and whose properties are dissimilar to the naturally occurring materials are considered anthropogenic soils (Soil Survey Staff, 2014a). New soil series were created to incorporate components with HAHT materials that had reasonably predictable soil properties. The predictability of the soil properties is partly due to standardized building practices adopted by developers over the years. If a soil has less than 50 cm of disturbed/modified material, or if the human-transported materials at the surface are similar to the natural soil, then the soil is considered a variation of the natural soil component.

The urban mapping procedures, as implemented for the Los Angeles soil survey, are as follows:

1. The landscape is mapped as close as possible to natural landscape units and breaks to capture the landform underlying the urban land. Every effort is made to achieve this standard. In places where mass grading has taken place and no historical evidence of where the natural landform ends or begins, the line is drawn to the extent of the current reshaped landform. All resources, such as geology maps and historical soil surveys, are used to delineate the landforms properly.

2. If necessary, the composition of the urban land component is phased to reflect the differing nature of this highly impermeable component. For example, residential areas may have strongly contrasting runoff properties compared to commercial or industrial areas. By phasing the urban land component, there is more flexibility in the development of useful map units.

3. As a last resort, map polygons can follow land use patterns if an area is highly disturbed. Dumps, mines, debris basins, seaports, and other highly disturbed landscapes can be delineated in this manner. Hillsides that have been leveled and sub-terraced for building or recreational development may also be delineated since a new anthropogenic landform now exists and differs from the adjacent naturally occurring landform (where present).

Anthropogenic Soil Descriptions and Symbols

This section explains the anthropogenic soil horizon nomenclature, anthropogenic master horizon symbols, and other relevant standards specific to describing human-altered/human-transported (HAHT) materials in this soil survey.

Horizon Designations

1. The caret (^) symbol in the master soil horizon indicates an anthropogenic soil horizon. Examples are ^A, ^B, ^C, and any transition horizons.

2. Numerical prefixes to master horizon symbols indicate a lithologic discontinuity at the contact of anthropogenic soil horizons with genetic (native) subsoil. Examples are ^Au-^Cu-2Bt-2BC and ^A-^Au-2Bk1-2Bk2.

3. The horizon suffix “u” indicates the presence of human-manufactured materials (artifacts). These materials include concrete, brick, bitumen (asphalt), glass, plastic, metal, abraded rock fragments, combustion by-products, and various construction debris. A complete list of recognized artifacts can be found in the “Keys to Soil Taxonomy” (Soil Survey Staff, 2014b).

Conventions Used to Describe Anthropogenic Horizon Features and Properties

Human-transported materials are a recent deposition that has been moved horizontally onto a pedon from a source area outside of that pedon by purposeful human activity, usually with the aid of machinery or hand tools (Soil Survey Staff, 2014b). Soil profile development and physical characteristics, including the content of artifacts, pH, and reaction rates, are documented in anthropogenic materials. Some properties may be interpreted by soil scientists as having developed before the materials were transported to the current location. These remnant soil properties in HAHT materials include soil structure, calcium carbonate masses, or a calcium carbonate equivalency greater than 15 percent below depths with observed pedogenesis. Evidence of pedogenesis in HAHT materials is most commonly observed at or near the surface. Soil structure, accumulation of humus, and redoximorphic features all support soil profile development in the upper soil horizons. For interpretation purposes, remnant soil properties (those that formed before the material was transported) are not considered pedogenic properties. For example, secondary calcium carbonate masses in HAHT materials are described but are not designated as a Bk horizon because they did not weather in place. Similarly, remnant soil structure is described but is not recognized as profile development and is not designated as a B horizon, as in a native soil.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2014b). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeralf (*Xe*, meaning Mediterranean (having hot, dry summers and cool, moist winters), plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxeralfs (*Hapl*, meaning minimal horizonation, plus *xeralf*, the suborder of the Alfisols that has a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplxeralfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, human-altered and human-transported material classes, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, thermic Typic Haploxeralfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil type recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each

series. A pedon, a small three-dimensional area of soil, which is typical of the soils in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 2017). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 2014b). Following the pedon description is the range of important characteristics of the soils in the series. Many soils could not be defined using the series level and are thus named using a higher level of taxonomy. At the end of this section, justification for the higher categories is provided and phase names for anthropogenic soils and impervious areas are explained.

Abaft Series

The Abaft series consists of very deep, somewhat excessively drained and excessively drained soils that formed in eolian sands from mixed sources. In many areas, these soils have a thin discontinuous layer of human-transported materials (HTM) overlying a native soil profile. They are on stabilized dunes and in beach areas on shore complexes. Slopes range from 0 to 30 percent. The mean annual precipitation is about 344 millimeters, and the mean annual temperature is about 17 degrees C.

Taxonomic Classification

Mixed, thermic Typic Xeropsamments

Typical Pedon (fig. 6)

Abaft fine sandy loam in an area of Urban land-Abaft, loamy surface complex, 5 to 30 percent slopes, terraced; Los Angeles County, California; Bruce’s Beach Park, Manhattan Beach, in the lower section above Manhattan Avenue; 33 degrees 53 minutes 39.27 seconds N. latitude and 118 degrees 24 minutes 56.83 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Venice, California. (Colors are dry soil unless otherwise noted.)

^A—0 to 15 centimeters; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish olive (10Y 3/2) moist; weak fine granular structure; very friable, soft, nonsticky, nonplastic; common very fine roots; many fine interstitial pores; slightly alkaline; abrupt wavy boundary.

2^C1—15 to 65 centimeters; light brownish gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; massive; very friable, moderately hard, nonsticky, nonplastic; fine irregular pores; slightly compacted; neutral; abrupt smooth boundary.

2C2—65 to 200 centimeters; very pale brown (10YR 7/3) sand, pale brown (10YR 6/3) moist; single grain; loose, loose, nonsticky, nonplastic; neutral.

Range in Characteristics

Soil moisture: Soil is dry in all parts from about mid-June to mid-November and is typically moist the rest of the year

Mean annual soil temperature: 18 to 22 degrees C

Human-transported materials: Typically a thin layer at the surface (less than 50 cm thick); if sandy in texture, material does not significantly differ from the native soil

A horizon:

Color—10YR 6/2, 6/3, 6/4, 5/2, 5/3, 4/2, 4/3, 4/4, 3/2, or 3/3

Texture—loamy sand or sand; sandy loam or finer in some locations with amended surfaces

Figure 6.—The Abaft series on an undeveloped side slope of sand dunes in Torrance (site in an open space north of Los Arboles Rocketship Park). Scale is in centimeters.

C horizons:
Color—10YR or 7.5YR 7/3, 7/2, 6/1, 6/2, 5/3, 5/4, 4/3, 4/4, or 4/2
Texture—loamy sand or sand

Alo Series

The Alo series consists of moderately deep, well drained soils that formed in material weathered from shale or sandstone on hills and mountains. Slopes range from 2 to 55 percent. The mean annual precipitation is about 400 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine, smectitic, thermic Aridic Haploxererts

Typical Pedon

Alo clay, 9 to 15 percent slopes; Orange County, California; University of California at Irvine campus; 33 degrees 38 minutes 53.2 seconds N. latitude and 117 degrees 50 minutes 53.2 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Tustin, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 4 centimeters; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium granular structure; firm, hard, very sticky, very plastic; common very fine roots; common fine tubular and common very fine tubular pores; slightly acid, pH 6.5; abrupt smooth boundary.

A2—4 to 38 centimeters; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong very coarse prismatic structure; firm, extremely hard, very sticky, very plastic; common very fine roots; few very fine tubular pores; neutral, pH 7.0; clear smooth boundary.

Bkss—38 to 64 centimeters; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure; firm, very hard, very sticky, very plastic; few very fine roots; few very fine tubular pores; 30 percent slickensides; medium spherical weakly cemented carbonate masses; strongly effervescent; cracks 1.25 cm wide to a depth of 64 cm; slickensides are intersecting; moderately alkaline, pH 8.0; clear wavy boundary.

Cr—64 to 150 centimeters; moderately cemented shale; carbonate coats on vertical cracks.

Range in Characteristics

Soil moisture: From about late April or May until November or December, soil is continuously dry and cracks 1.25 to 5 cm wide extend from the surface to a depth of 50 cm or more; during the rest of the year, soil is moist in some or all parts below a depth of 12.5 cm and the cracks are closed

Mean annual soil temperature: 18 to 21 degrees C

Slickensides: Few to many on faces of peds

Depth to bedrock: 50 to 100 cm to moderately cemented sedimentary rock

Clay content: 35 to 55 percent

A horizons:

Dry color—10YR 4/2, 4/3, 5/2, or 5/3

Moist color—10YR 3/1, 3/2, 3/3, 4/2, or 4/3

Texture—clay loam, silty clay, or clay

Rock fragments—less than 5 percent shale and other fragments

Reaction—slightly acid to moderately alkaline

Calcium carbonate—soil is not calcareous in the upper 12 to 20 inches or none of the A horizon is calcareous

Bk or Bkss horizon:

Dry color—10YR 4/4, 5/2, 5/3, 5/4, 6/2, 6/3, or 6/4

Moist color—10YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, or 5/3

Texture—clay loam, silty clay, or clay

Rock fragments—0 to 10 percent shale and other fragments

Anaheim Series

The Anaheim series consists of moderately deep, well drained soils. These soils formed in material weathered from shale or sandstone on hills and mountains. Slopes range from 9 to 75 percent. The mean annual precipitation is about 400 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls

Typical Pedon

Anaheim loam in an area of Anaheim-Soper complex, 20 to 55 percent slopes; Los Angeles County, California; City of Industry, on a north-facing convex, colluvial slope on a southern ridge above Tonner Canyon Road, in a stand of oaks and annual grasses; 33 degrees 57 minutes 46.24 seconds N. latitude and 117 degrees 48 minutes 57.24 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Yorba Linda, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 12 centimeters; dark grayish olive (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; friable, slightly hard, moderately sticky, moderately plastic; common very fine interstitial pores; neutral, pH 6.7; clear wavy boundary.

A2—12 to 40 centimeters; brown (10YR 4/3) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; friable, moderately sticky, moderately plastic; common fine and few medium tubular pores; neutral, pH 6.7; gradual wavy boundary.

A3—40 to 80 centimeters; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; friable, moderately sticky, moderately plastic; common fine and common very fine tubular pores; neutral, pH 6.8; clear wavy boundary.

C—80 to 95 centimeters; pale brown (10YR 6/3) sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; friable, moderately sticky, moderately plastic; common very fine tubular pores; neutral, pH 6.8; clear wavy boundary.

Cr—95 to 120 centimeters; moderately cemented sandstone.

Range in Characteristics

Soil moisture: Soil is continuously dry at a depth of 13 to 38 cm from late April or May until November or December and is moist in some part for the rest of the year
Mean annual soil temperature: 18 to 21 degrees C
Depth to paralithic contact: 50 to 100 cm to moderately cemented sandstone

A horizons:
Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/2, 3/1, 3/2, or 3/3
Texture—loam, clay loam, or sandy clay loam
Organic matter content—1 to 3 percent to a depth of more than 50 cm
Reaction—slightly acid to slightly alkaline

C horizon:
Dry color—10YR 5/4, 6/3, 6/4, or 7/3
Moist color—10YR 4/3, 4/4, 5/4, or 6/4
Texture—loam, clay loam, or sandy clay loam
Reaction—slightly acid to slightly alkaline

Cr horizon:
Texture—moderately cemented sandstone or shale

Anthraltic Xerorthents, Loamy Substratum

Anthraltic Xerorthents, loamy substratum formed in human-altered materials over alluvium derived from material weathered from sedimentary sources. These soils are on alluvial fans in areas with surface grading (fig. 7). Slopes range from 0 to 5 percent.

Figure 7.—Landscape of Anthraltic Xerorthents, loamy substratum, on a greenway in Beverly Hills.

The mean annual precipitation is about 410 millimeters, and the mean annual air temperature is about 17.8 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, nonacid, thermic Anthraltic Xerorthents

Typical Pedon

Anthraltic Xerorthents, loamy substratum in an area of Urban land-Anthraltic Xerorthents, loamy substratum-Grommet complex, 0 to 5 percent slopes; Los Angeles County, California; City of Beverly Hills, at Beverly Gardens Park, in greenway buffer northwest of Santa Monica Boulevard, between Alpine Drive and Rexford Drive; 34 degrees 4 minutes 36.57 seconds N. latitude and 118 degrees 23 minutes 47.19 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Beverly Hills, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 13 centimeters; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; friable, slightly sticky, slightly plastic; slightly alkaline, pH 7.4; abrupt smooth boundary.

^Au—13 to 21 centimeters; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; massive and weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; 1 percent irregular 2- to 75-millimeter angular brick and 1 percent irregular 2- to 75-millimeter angular bitumen (asphalt) fragments; slightly alkaline, pH 7.4; clear smooth boundary.

^Cu—21 to 65 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; massive; friable, moderately sticky, moderately plastic; 1 percent irregular angular brick and 1 percent elongated 2- to 75-millimeter rounded plastic fragments; slightly alkaline, pH 7.4; abrupt smooth boundary.

2Bt1—65 to 105 centimeters; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; massive; friable, moderately sticky, moderately

plastic; 5 percent faint clay bridges between sand grains; 2 percent subrounded 2- to 75-millimeter slate fragments; neutral, pH 7.2; gradual wavy boundary.

2Bt2—105 to 150 centimeters; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/6) moist; massive; friable, moderately sticky, moderately plastic; 5 percent faint clay bridges between sand grains; 1 percent subrounded 6- to 75-millimeter and 4 percent subrounded 2- to 5-millimeter mixed rock fragments; neutral, pH 7.2.

Range in Characteristics

Note: These soils are mapped at the subroup level due to their small extent and variable properties that fall outside the range of characteristics for existing soil series.

Human-altered materials: Typically 50 to 115 cm thick and variable in texture; the source is typically local soil material that is mechanically mixed; some isolated locations have transported materials from offsite sources

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Calcium carbonate: Typically none, but some pedons are calcareous in the subsoil

^A or ^Au horizon:

Dry color—10YR 4/2, 4/3, or 5/3
Moist color—10YR 2/2, 3/2, 3/3, or 4/2
Texture—loam or clay loam
Artifacts—0 to 10 percent mixed construction debris

^C or ^Cu horizon:

Dry color—10YR 4/3, 5/3, 5/4, 6/3, or 6/4
Moist color—10YR 3/3, 3/4, 4/3, 4/4, 5/3, or 5/4
Texture—loam or clay loam or, less commonly, sandy loam
Artifacts—0 to 10 percent mixed construction debris

2Bt or BC horizons:

Dry color—10YR 4/3, 5/3, 5/4, 6/3, or 6/4
Moist color—10YR 3/2, 3/3, 3/4, 4/3, 4/4, or 4/6
Texture—loam, clay loam, or sandy clay loam
Note—some pedons do not have clay films or bridging

Apollo Series

The Apollo series consists of deep, well drained soils that formed in colluvium and/or residuum weathered from calcareous shale. These soils are on side slopes of hills (fig. 8). Slopes range from 10 to 75 percent. The mean annual precipitation is about 446 millimeters, and the mean annual air temperature is about 18.3 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls

Typical Pedon

Apollo clay loam in an area of Zaca-Apollo, warm complex, 20 to 55 percent slopes; Los Angeles County, California; on a south slope near Hacienda Boulevard at the Puente Hills Native Habitat Nature Preserve; 33 degrees 58 minutes 25.00 seconds N. latitude and 117 degrees 58 minutes 49.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: La Habra, California. (Colors are for dry soil unless otherwise noted.)

Figure 8.—Apollo soils on rolling hills with calcareous sedimentary bedrock. Photo taken at the Puente Hills Native Habitat Nature Preserve in Whittier, California.

A—0 to 10 centimeters; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky structure; friable, hard, very sticky, very plastic; common very fine interstitial pores; 3 percent subangular indurated 2- to 5-millimeter calcareous shale fragments; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Btk1—10 to 28 centimeters; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; strong coarse subangular blocky structure; friable, hard, very sticky, very plastic; common very fine tubular pores; 10 percent prominent clay films on all faces of peds; 2 percent subangular indurated 2- to 5-millimeter calcareous shale fragments; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Btk2—28 to 65 centimeters; pale brown (10YR 6/3) clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; friable, hard, very sticky, very plastic; common very fine tubular pores; 10 percent faint clay films on all faces of peds; 5 percent distinct irregular light brownish gray (10YR 6/2) carbonate masses in cracks; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk—65 to 115 centimeters; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; friable, hard, very sticky, very plastic; common very fine tubular pores; 15 percent distinct irregular light brownish gray (10YR 6/2) and light gray (10YR 7/2) carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.0 (pH indicator solutions); abrupt wavy boundary.

Cr—115 to 140 centimeters; moderately cemented siltstone and shale.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Depth to paralithic contact: 100 to 180 cm

Organic matter content: 1 to 3 percent from the surface to a depth of 25 to 50 cm
Clay content: 24 to 35 percent
Calcium carbonate: Soil is typically calcareous throughout; some pedons are noncalcareous in the upper 45 cm; secondary carbonates occur within 60 cm of the surface in the Bk and Btk horizons

A horizon:
Dry color—2.5Y or 10YR 4/2, 4/3, 5/3, or 6/3
Moist color—2.5Y or 10YR 2/2, 3/2, 3/3, or 4/2
Texture—clay loam, loam, or silt loam
Calcium carbonate equivalency—0 to 5 percent

Bk or Btk horizons:
Dry color—2.5Y or 10YR 4/3, 4/4, 5/2, 5/3, 5/4, 5/6, or 6/4
Moist color—2.5Y or 10YR 3/2, 3/3, 3/4, 4/3, 4/4, 4/6, or 5/4
Texture—clay loam, loam, or silt loam
Secondary carbonates—few or common carbonate masses
Calcium carbonate equivalency—3 to 12 percent

Aquic Xerorthents

Aquic Xerorthents are somewhat poorly drained soils that formed in human-transported materias (HTM) over alluvium. These soils are in filled marshland on coastal plains. Slopes range from 0 to 2 percent. The mean annual precipitation is about 330 millimeters, and the mean annual air temperature is about 17.2 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, calcareous, thermic Aquic Xerorthents

Typical Pedon

Aquic Xerorthents in an area of Urban land-Aquic Xerorthents-Xerorthents, dredged spoil complex, 0 to 2 percent slopes; Los Angeles County, California; Wilmington, at Wilmington Recreation Center, Los Angeles City Parks, 50 feet south of basketball and skate park area; 33 degrees 46 minutes 26.70 seconds N. latitude and 118 degrees 16 minutes 10.40 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Torrance, California. (Colors are for dry soil unless otherwise noted.)

^Au—0 to 8 centimeters; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine roots; finely disseminated carbonate; 1 percent glass and 2 percent bitumen (asphalt) fragments; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

^Cu1—8 to 23 centimeters; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common very fine roots; finely disseminated carbonate; 3 percent subangular 2- to 75-millimeter mixed rock fragments; 1 percent 2- to 75-millimeter metal, 2 percent 2- to 75-millimeter concrete, and 3 percent 2- to 75-millimeter bitumen (asphalt) fragments; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

^Cu2—23 to 40 centimeters; brown (10YR 5/3) clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; friable, slightly hard, very sticky, moderately plastic; common very fine roots; 5 percent distinct clay films on all faces of peds; finely disseminated carbonate; 2 percent subangular 2- to 75-millimeter mixed rock fragments; 1 percent 2- to 75-millimeter glass fragments; slightly effervescent; slightly alkaline, pH 7.6; clay films are remnants of source material; clear wavy boundary.

2C1—40 to 65 centimeters; light brownish yellow (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; very friable, nonsticky, nonplastic; finely disseminated carbonate; slightly effervescent; slightly alkaline, pH 7.6; clear wavy boundary.

2C2—65 to 105 centimeters; light gray (10YR 7/1) fine sand, 5 percent dark yellowish brown (10YR 4/4) and 95 percent dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, nonplastic; slightly alkaline, pH 7.6; gradual wavy boundary.

3Cg1—105 to 140 centimeters; grayish brown (10YR 5/2) stratified fine sand to very fine sandy loam, 5 percent very dark grayish brown (10YR 3/2) and 95 percent grayish brown (2.5Y 5/2) moist; moderate medium platy structure and massive; very friable, nonsticky, nonplastic; 2 percent medium distinct irregular gray (10YR 6/1) iron depletions in matrix and 5 percent fine prominent irregular yellowish brown (10YR 5/6) iron-manganese masses in matrix; finely disseminated carbonate; 2 percent 2- to 75-millimeter wood fragments; slightly effervescent; slightly alkaline, pH 7.6; gradual wavy boundary.

3Cg2—140 to 160 centimeters; gray (2.5Y 6/1) stratified fine sand to very fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; very friable, nonsticky, nonplastic; 2 percent medium distinct irregular gray (10YR 6/1) iron depletions in matrix and 5 percent fine prominent irregular yellowish brown (10YR 5/6) iron-manganese masses in matrix; finely disseminated carbonate; slightly effervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

4Ab—160 to 175 centimeters; dark brown (7.5YR 3/4) fine sand; massive; very friable, nonsticky, nonplastic; slightly alkaline, pH 7.6.

Range in Characteristics

Note: These soils are mapped at the subroup level due to their small extent and variable properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil is periodically saturated, unless drained, in the subsoil during part of the winter and spring or longer

Mean annual soil temperature: 17 to 20 degrees C

Thickness of human-transported materials: 10 to 75 cm; typically less than 50 cm

Depth to redoximorphic features: 80 to 110 cm; depths vary based on thickness of the HTM at the surface

Calcium carbonate: Disseminated carbonate is present in most horizons but may be absent in some stratified layers

^A or ^Au horizon:

Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/2, 2/3, 3/2, or 3/3
Texture—sandy loam or loam
Artifacts—0 to 10 percent mixed construction debris

^C or ^Cu horizons:

Dry color—2.5Y or 10YR 4/3, 4/4, 5/3, or 5/4
Moist color—2.5Y or 10YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/3, or 5/4
Texture—sandy loam, loamy sand, or imported finer textures (such as clay loam or silty clay loam)
Artifacts—0 to 10 percent mixed construction debris

2C horizons:

Dry color—2.5Y or 10YR 4/3, 4/4, 5/3, 5/4, 6/3, 6/4, 7/1, 7/2, or 7/3
Moist color—2.5Y or 10YR 4/2, 4/3, 4/4, 5/2, 5/3, 5/4, or 6/3
Texture—stratified sandy loam, loamy sand, or sand that has lenses of silt loam or silty clay loam

Figure 9.—An area of Aquic Xerorthents, fine substratum. Photo taken at a city park in Gardena, California, northeast of the intersection off Van Ness and West 135th Street.

3Cg horizons:
Dry color—2.5Y or 10YR 5/1, 5/2, 6/1, 6/2, 7/1, or 7/2
Moist color—2.5Y or 10YR 4/2, 5/1, 5/2, 6/2, or 6/1
Texture—stratified sandy loam, loamy sand, or sand that has lenses of silt loam or silty clay loam

Aquic Xerorthents, Fine Substratum

Aquic Xerorthents, fine substratum are somewhat poorly drained soils that formed in human-transported materials over mixed alluvium. These soils are on coastal plains (fig. 9). Slopes range from 0 to 2 percent. The mean annual precipitation is about 350 millimeters, and the mean annual air temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, spolic, mixed, superactive, calcareous, thermic Aquic Xerorthents

Typical Pedon

Aquic Xerorthents, fine substratum in an area of Urban land-Aquic Xerorthents, fine substratum-Cropley complex, 0 to 5 percent slopes; Los Angeles County, California; Rowley Park Ball Fields, Gardena; 33 degrees 54 minutes 40 seconds N. latitude and 118 degrees 19 minutes 1 second W. longitude, WGS 84 – U.S.G.S. Quad: Inglewood, California. (Colors are for dry soil unless otherwise noted.)

^Au—0 to 18 centimeters; dark grayish brown (10YR 4/2) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; friable, moderately sticky, slightly plastic; common medium and common very fine roots; common very fine tubular pores; finely disseminated carbonate; very slightly effervescent; neutral, pH 6.8; clear wavy boundary.

^Cu1—18 to 75 centimeters; brown (10YR 4/3) clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; common fine roots; common very fine tubular pores; finely disseminated carbonate; 2 percent subrounded 2- to 5-millimeter mixed rock fragments; 1 percent 2- to 75-millimeter brick fragments and 3 percent 2- to 75-millimeter concrete fragments; few thin seams of sandy loam material; very slightly effervescent; slightly alkaline, pH 7.6; clear wavy boundary.

^Cu2—75 to 95 centimeters; brown (10YR 4/3) clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; common fine roots; common very fine tubular pores; 8 percent medium distinct irregular strong brown (7.5YR 4/6) iron-manganese masses in matrix; finely disseminated carbonate; 2 percent subrounded 2- to 5-millimeter mixed rock fragments; 2 percent 2- to 75-millimeter brick fragments; few thin seams of sandy loam material; very slightly effervescent; slightly alkaline, pH 7.6; clear wavy boundary.

2Bkg—95 to 200 centimeters; gray (2.5Y 6/1) clay, gray (2.5Y 6/1) moist; massive; firm, very sticky, very plastic; common fine roots; 3 percent fine distinct irregular light olive brown (2.5Y 5/4) and 5 percent medium distinct irregular strong brown (7.5YR 4/6) iron-manganese masses in matrix; finely disseminated carbonate and 5 percent coarse prominent irregular white (10YR 8/1) carbonate masses in matrix; very slightly effervescent; slightly alkaline, pH 7.4.

Range in Characteristics

Note: These soils are mapped at the subroup level due to their small extent and variable properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil is periodically saturated, unless drained, in the subsoil during part of the winter and spring or longer

Mean annual soil temperature: 18 to 20 degrees C

Thickness of human-transported materials: 60 to 145 cm

Depth to redoximorphic features: 50 to 100 cm

Calcium carbonate: Disseminated calcium carbonate typically occurs throughout the profile; some pedons have masses of calcium carbonate in the natural subsoil

^A or ^Au horizon:
Dry color—10YR 3/1, 3/2, 3/3, 4/2, 4/3, or 5/2
Moist color—10YR 2/2, 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—loam or clay loam

^C or ^Cu horizons:
Color—mixed matrix color of 10YR 3/2, 3/3, 3/4, 4/3, or 4/4
Texture—loam or clay loam

2Bkg horizon:
Color—2.5Y or 10YR 4/1, 5/1, 5/2, 6/1, 6/2, or 7/1
Texture—clay
Gypsum—some pedons have 0 to 5 percent masses of gypsum

Aquic Xerorthents, Graded

Aquic Xerorthents, graded are moderately well drained soils that formed in human-transported materials, mostly from dredged spoil on the coastal plain. These soils are on filled landscapes near the coast, in the Venice Beach and Playa Vista area. Slopes range from 0 to 2 percent. The mean annual precipitation is about 350 millimeters, and the mean annual air temperature is about 17 degrees C.

Taxonomic Classification

Fine-loamy, spolic, mixed, superactive, nonacid, thermic Aquic Xerorthents

Typical Pedon

Aquic Xerorthents, graded in an area of Urban land-Aquic Xerorthents, graded-Pacheco, warm complex, 0 to 2 percent slopes; Los Angeles County, California; Venice Beach area, 70 meters west and 30 meters south of the intersection of Westminster Avenue and Abbot Kinney Boulevard; 33 degrees 59 minutes 30 seconds N. latitude and 118 degrees 28 minutes 17 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Venice, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 8 centimeters; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; very rigid, slightly hard, slightly sticky, slightly plastic; common fine and very fine roots throughout; common very fine irregular pores; 2 percent nonflat subangular indurated 2- to 5-millimeter and 3 percent nonflat subangular indurated 5- to 75-millimeter granite fragments; slightly alkaline, pH 7.8; clear smooth boundary.

^Cu1—8 to 22 centimeters; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; massive and weak coarse subangular blocky structure; firm, hard, slightly sticky, moderately plastic; common fine and very fine roots throughout; common fine interstitial pores; 10 percent faint dark brown (10YR 3/3) clay films on all faces of peds; 7 percent medium faint irregular grayish brown (10YR 5/2) iron depletions in matrix and 10 percent medium distinct irregular strong brown (7.5YR 4/6) iron-manganese nodules with sharp boundaries in matrix; 2 percent nonflat subangular indurated 2- to 5-millimeter and 3 percent nonflat subangular indurated 5- to 75-millimeter granite fragments; 1 percent 2- to 75-millimeter brick, 1 percent 2- to 75-millimeter glass, 2 percent 2- to 75-millimeter concrete, and 3 percent 2- to 75-millimeter bitumen (asphalt) fragments; moderately alkaline, pH 8.0; soil structure and clay films are remnants of the source material, formed prior to transport; clear wavy boundary.

^Cu2—22 to 75 centimeters; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; friable, hard, slightly sticky, moderately plastic; common fine and very fine roots throughout; common fine and very fine irregular pores; 10 percent faint dark brown (10YR 3/3) clay films on all faces of peds; 2 percent nonflat subangular indurated 2- to 5-millimeter and 3 percent nonflat subangular indurated 5- to 75-millimeter granite fragments; 1 percent 2- to 75-millimeter concrete and 2 percent 2- to 75-millimeter bitumen (asphalt) fragments; soil structure and clay films are remnants of source material, formed prior to transport; moderately alkaline, pH 8.0; clear wavy boundary.

^Cu3—75 to 100 centimeters; olive gray (5Y 5/2) fine sand, olive (5Y 4/4) moist; single grain; loose, loose, nonsticky, nonplastic; 10 percent medium prominent irregular gray (10YR 5/1) iron depletions in matrix and 15 percent medium prominent irregular yellowish brown (10YR 5/6) iron-manganese masses in matrix; shell fragments; 2 percent nonflat subangular indurated 2- to 5-millimeter and 6 percent nonflat subangular indurated 5- to 75-millimeter granite fragments; moderately alkaline, pH 8.0; clear wavy boundary.

^Cu4—100 to 110 centimeters; dark gray (2.5Y 4/1) fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure; very friable, slightly hard, nonsticky, nonplastic; 10 percent medium prominent irregular gray (10YR 5/1) iron depletions in matrix and 15 percent medium prominent irregular yellowish brown (10YR 5/6) iron-manganese masses in matrix; 1 percent nonflat subangular indurated 2- to 5-millimeter and 2 percent nonflat subangular indurated 5- to 75-millimeter granite fragments; 1 percent 2- to 75-millimeter bitumen (asphalt) and 2 percent 2- to 75-millimeter brick fragments; moderately alkaline,

pH 8.2; soil structure is a remnant of the source material, formed prior to transport; gradual smooth boundary.

^Cu5—110 to 150 centimeters; grayish brown (10YR 5/2) loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; friable, hard, moderately sticky, slightly plastic; 10 percent faint dark yellowish brown (10YR 4/4) clay bridges between sand grains; 7 percent medium faint irregular grayish brown (10YR 5/2) iron depletions in matrix and 10 percent medium distinct irregular strong brown (7.5YR 4/6) iron-manganese nodules with sharp boundaries in matrix; 2 percent nonflat subangular indurated 2- to 5-millimeter and 4 percent nonflat subangular indurated 5- to 75-millimeter granite fragments; strongly effervescent; moderately alkaline, pH 8.3; soil structure and calcium carbonate are remnants of the source material, formed prior to transport.

Range in Characteristics

Note: These soils are mapped at the subroup level due to their small extent and variable properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil is periodically saturated, unless drained, in the subsoil during part of the winter and spring or longer

Depth to redoximorphic features: 75 to 125 cm

Thickness of human-transported materials: More than 100 cm; typically more than 200 cm

Color: Multiple matrix colors are common, with sharp boundaries between colors

^A or ^Au horizon:

Dry color—10YR 4/2, 4/3, 5/2, 5/3, or 6/3

Moist color—10YR 3/2, 3/3, 4/2, or 4/3

Texture—sandy loam or loam

Artifacts—0 to 15 percent construction debris

^C or ^Cu horizons:

Dry color—2.5Y or 10YR 4/1, 4/2, 4/3, 5/1, 5/2, 5/3, 6/2, or 6/3

Moist color—2.5Y or 10YR 3/2, 3/3, 3/4, 4/2, 4/3, or 4/4

Texture—sandy loam, sandy clay loam, loam, or clay loam; some pedons have horizons with sandy textures

Artifacts—0 to 15 percent construction debris

Arbolado Series

The Arbolado series consists of very deep, well drained soils that formed in human-transported materials (HTM) that originate mostly from alluvium derived from sedimentary sources. These soils are on graded alluvial fans and graded flood plains (fig. 10). Slopes range from 0 to 9 percent. The mean annual precipitation is about 356 millimeters, and the mean annual air temperature is about 18 degrees C.

Taxonomic Classification

Fine, spolic, smectitic, thermic Entic Haploxerolls

Typical Pedon (fig. 11)

Arbolado clay loam in an area of Urban land-Sorrento-Arbolado complex, 2 to 9 percent slopes; Los Angeles County, California; northwest corner of ballfield at Los Molinos Elementary School, in Hacienda Heights; 33 degrees 59 minutes 2.0 seconds N. latitude and 117 degrees 58 minutes 42.0 seconds W. longitude, WGS 84 – U.S.G.S. Quad: La Habra, California. (Colors are dry soil unless otherwise noted.)

Figure 10.—An area of Arbolado soil in Hacienda Heights. Terracing is visible between the edge of the road and the elevated field.

^A1—0 to 5 centimeters; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; moderately hard, friable, moderately sticky, moderately plastic; common fine and medium roots; neutral, pH 7.2; clear wavy boundary.

^A2—5 to 40 centimeters; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate very coarse subangular blocky structure parting to strong medium granular; hard, friable, moderately sticky, moderately plastic; common fine and coarse roots; common very fine tubular pores; many distinct pressure faces; few fine irregular calcium carbonate masses; variegated matrix color; 3 percent gravel; very slightly effervescent; neutral, pH 7.2; abrupt broken boundary. (Combined thickness of the ^A horizons is 5 to 47 cm)

^C1—40 to 75 centimeters; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common fine and medium roots; common very fine tubular pores; many distinct pressure faces; few fine distinct irregular calcium carbonate masses; variegated matrix color; 3 percent gravel; very slightly effervescent; neutral, pH 7.2; abrupt broken boundary.

^C2—75 to 90 centimeters; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; strong coarse subangular blocky structure; hard, friable, moderately sticky, moderately plastic; few fine roots; common very fine tubular pores; many distinct pressure faces; common fine irregular calcium carbonate masses; variegated matrix color; 8 percent gravel; very slightly effervescent; slightly alkaline, pH 7.6; abrupt broken boundary.

^C3—90 to 110 centimeters; brown (10YR 5/3) clay, very dark grayish brown (10YR 3/2) moist; massive; very hard, very firm, very sticky, very plastic; common fine

Figure 11.—Representative profile of the Arbolado series showing alternating light and dark layers of human-transported materials. Scale is in centimeters.

distinct irregular calcium carbonate masses; variegated matrix color; 5 percent gravel; very slightly effervescent; slightly alkaline, pH 7.6; abrupt broken boundary.

^C4—110 to 150 centimeters; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; massive; very hard, very firm, very sticky, very plastic; common fine irregular calcium carbonate masses; variegated matrix color; 4 percent gravel; very slightly effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 20 degrees C

Rock fragment content: 0 to 15 percent

Reaction: Neutral to moderately alkaline

Redoximorphic features (if they occur): 0 to 5 percent iron-manganese masses and iron depletions; typically isolated within the upper 30 cm in heavily irrigated areas
Thickness of human-transported materials: 100 to 200 cm; typically more than 150 cm

^A or ^Au horizons:
Dry color—10YR 4/2, 4/3, 4/4, 5/3, or 5/4
Moist color—10YR 2/2, 3/1, 3/2, 3/3, 3/4, or 4/3
Texture—clay loam, loam, silty clay loam, or sandy clay loam
Clay content—22 to 38 percent
Artifacts—0 to 5 percent construction debris

^C or ^Cu horizons:
Dry color—10YR or 2.5Y 4/3, 4/4, 5/3, 6/3, or 6/4
Moist color—10YR or 2.5Y 3/1, 3/2, 3/3, 3/4, 3/2, 4/3, 4/4, 5/3, or 6/3
Texture—clay loam, clay, or silty clay loam or, less commonly, silty clay
Clay content—28 to 45 percent
Calcium carbonate—0 to 5 percent masses of calcium carbonate that were transported from the source material
Artifacts—0 to 5 percent construction debris

Azuvina Series

The Azuvina series consists of very deep, well drained soils that formed in old alluvium weathered from granitic sources. These soils are on alluvial fans and fan remnants, typically in urban areas where surface modification is common. Slopes range from 0 to 15 percent. The mean annual precipitation is about 450 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Typic Argixerolls

Typical Pedon (fig. 12)

Azuvina loam in an area of Urban land-Azuvina-Montebello complex, 0 to 5 percent slopes; Los Angeles County, California; Montebello Park, Montebello, in front lawn 50 feet east of Park Street and 200 feet south of Whittier Boulevard; 34 degrees 0 minutes 40 seconds N. latitude and 118 degrees 6 minutes 56 seconds W. longitude, WGS 84 – U.S.G.S. Quad: El Monte, California. When described, the soil was moist at the surface and dry in the subsoil. (Colors are for dry soil unless otherwise noted.)

^A1—0 to 13 centimeters; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium granular structure; friable, moderately hard, moderately sticky, slightly plastic; common very fine tubular pores; moderately alkaline, pH 7.9; clear wavy boundary.
^A2—13 to 35 centimeters; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; friable, moderately hard, moderately sticky, slightly plastic; few medium and common very fine tubular pores; 2 percent gravel; moderately alkaline, pH 8.2; clear wavy boundary.
2Bt1—35 to 60 centimeters; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; friable, moderately sticky, moderately plastic; few medium and common very fine tubular pores; distinct clay films on all faces of peds; 1 percent gravel; slightly alkaline, pH 7.7; clear wavy boundary.
2Bt2—60 to 110 centimeters; strong brown (7.5YR 4/6) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; friable, moderately sticky, moderately plastic; common very fine tubular pores; common

Figure 12.—Representative sample of the Azuvina series. The profile has a thick, dark surface layer (top left of tarp) that grades to a reddish brown argillic horizon (top right).

distinct clay films on all faces of peds; 1 percent gravel; slightly alkaline, pH 7.7; clear wavy boundary.

2BCt1—110 to 145 centimeters; strong brown (7.5YR 4/6) fine sandy loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; friable, moderately sticky, moderately plastic; common very fine tubular pores; common distinct clay films on all faces of peds; 5 percent gravel; slightly alkaline, pH 7.8; clear wavy boundary.

2BCt2—145 to 200 centimeters; strong brown (7.5YR 4/6) fine sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; friable, moderately sticky, moderately plastic; common very fine tubular pores; common faint clay bridges between sand grains; 1 percent gravel; slightly alkaline, pH 7.5.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Depth to argillic horizon: 30 to 70 cm; thickness of the human-transported material at the surface affects this depth

Rock fragment content: 0 to 10 percent

Organic matter content: 2 to 5 percent at the surface; decreasing to 1 percent or less within 50 cm of the mineral surface

Figure 13.—An area of Balcom soil. Balcom soils are typically on steep, south-facing side slopes with shrubs and grasses.

A or ^Au horizons:
Dry color—10YR or 7.5YR 3/2, 4/2, 4/3, or 5/3
Moist color—10YR or 7.5YR 2/2, 3/2, or 3/3
Texture—loam, fine sandy loam, sandy loam, or sandy clay loam
Clay content—12 to 22 percent

Bt horizons:
Dry color—10YR or 7.5YR 4/3, 4/4, 4/6, 5/3, 5/4, or 6/3
Moist color—10YR or 7.5YR 3/3, 3/4, 4/3, 4/4, or 4/6
Texture—clay loam, sandy clay loam, or loam
Clay content—21 to 33 percent

BC or BCt horizons:
Dry color—10YR or 7.5YR 4/4, 4/6, 5/4, 5/6, or 7/3
Moist color—10YR or 7.5YR 3/4, 4/3, 4/4, 4/6, or 5/6
Texture—fine sandy loam, loam, or sandy clay loam
Clay content—12 to 24 percent; decreasing by 6 percent or more from the overlying Bt horizon
Note—some pedons are hard or very hard when dry

Balcom Series

The Balcom series consist of moderately deep, well drained soils that formed in material weathered from soft, calcareous sedimentary bedrock. These soils are on hills (fig. 13). Slopes range from 9 to 75 percent. The mean annual precipitation is about 463 millimeters, and the mean annual temperature is about 18.3 degrees C.

Figure 14.—Representative profile of the Balcom series. A calcic horizon is a at a depth of 60 centimeters. Photo taken on a south-facing slope in the southeastern part of Griffith Park. Scale is in centimeters.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Typic Calcixerepts

Typical Pedon (fig. 14)

Balcom clay loam in an area of Balcom-Nacimiento, warm complex, 30 to 75 percent slopes; Los Angeles County, California; City of Los Angeles, Griffith Park, 200 meters up trail from Utility Pole off of SE Fire Road trail; 34 degrees 7 minutes 18 seconds N. latitude and 118 degrees 16 minutes 50 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Hollywood, California. When described, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

A—0 to 8 centimeters; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium granular structure; friable, slightly hard, moderately sticky, moderately plastic; common fine and very fine roots; common fine tubular and common very fine interstitial pores; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk—8 to 27 centimeters; brown (10YR 4/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; friable, slightly hard, moderately sticky, moderately plastic; common very fine roots; common fine tubular and common very fine interstitial pores; finely disseminated carbonate and 3 percent fine prominent irregular white (10YR 8/1) carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Btk1—27 to 60 centimeters; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium and moderate coarse subangular blocky structure; friable, slightly hard, moderately sticky, moderately plastic; common medium and very fine roots; common fine tubular and common very fine interstitial pores; faint clay films on all faces of peds; finely disseminated carbonate and 10 percent fine prominent irregular white (10YR 8/1) carbonate masses in matrix; 1 percent angular 2- to 5-millimeter and 2 percent angular 6- to 75-millimeter calcareous shale fragments; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Btk2—60 to 80 centimeters; dark yellowish brown (10YR 4/6) loam, dark yellowish brown (10YR 4/6) moist; weak fine subangular blocky structure; friable, hard, moderately sticky, moderately plastic; common medium and very fine roots; common fine and very fine interstitial pores; faint clay films on all faces of peds; 10 percent finely disseminated carbonate and 10 percent fine prominent irregular white (10YR 8/1) carbonate masses in matrix; 5 percent angular 2- to 75-millimeter calcareous shale fragments; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Cr—80 to 105 centimeters; moderately cemented shale.

Range in Characteristics

Soil moisture: Soil is continuously dry at a depth of 13 to 38 cm from late April or May until November or December and is moist in some part for the rest of the year
Mean annual soil temperature: 18 to 21 degrees C
Depth to bedrock: 50 to 120 cm to moderately cemented calcareous sedimentary rock
Depth to calcic horizon: 35 to 82 cm to a calcium carbonate equivalency of 15 to 25 percent
Rock fragment content: Typically less than 5 percent; some pedons have up to 25 percent in localized landslide areas
Clay content: 24 to 32 percent
Reaction: Moderately alkaline
Effervescence: Slight to violent throughout the profile

A horizon:
Dry color—2.5Y or 10YR 4/2, 4/3, 5/2, 5/3, 6/2, or 6/3
Moist color—2.5Y or 10YR 3/2, 3/3, 4/2, or 4/3
Texture—clay loam or loam

Bk or Btk horizon:
Dry color—2.5Y or 10YR 4/3, 4/4, 5/2, 5/3, 6/2, 6/3, 7/2, 7/3, or 7/4
Moist color—2.5Y or 10YR 3/3, 3/4, 4/2, 4/3, 4/4, 4/6, 5/4, or 5/6
Texture—clay loam or loam
Calcium carbonate—ranging from few small filaments to many seams or masses

Ballast Series

The Ballast series consists of moderately deep, moderately well drained soils that formed from calcareous shale and limestone. These soils are on hills and slump blocks (fig. 15). Slopes range from 25 to 75 percent. The mean annual precipitation is about 383 millimeters, and the mean annual temperature is about 17.2 degrees C.

Figure 15.—An area of Ballast soil at the Three Sisters Reserve (part of the Palos Verdes Nature Preserve).

Taxonomic Classification

Fine, smectitic, thermic Typic Calcixerolls

Typical Pedon (fig. 16)

Ballast clay loam in an area of Zaca-Ballast complex, 10 to 50 percent slopes; Los Angeles County, California; Rancho Palos Verdes, mid-slope of slump on spur of Altamira Shale at Three Sisters Reserve, Palos Verdes Nature Preserve; 33 degrees 45 minutes 3.33 seconds N. latitude and 118 degrees 23 minutes 4.1 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Redondo Beach, California. When described, the soil was dry throughout. (Soil colors are for dry soil unless otherwise noted.)

A—0 to 17 centimeters; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong coarse granular structure; friable, very sticky, very plastic; 2 percent flat angular strongly cemented 2- to 5-millimeter and 3 percent flat angular strongly cemented 6- to 150-millimeter calcareous shale fragments; strongly effervescent; moderately alkaline, pH 7.8; clear wavy boundary.

Btk1—17 to 56 centimeters; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate coarse prismatic structure; firm, very sticky, very plastic; 65 percent clay films on all faces of peds; carbonate masses; 2 percent flat angular strongly cemented 2- to 5-millimeter and 3 percent flat angular strongly cemented 2- to 150-millimeter calcareous shale fragments; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Figure 16.—Representative profile of the Ballast series. A calcic horizon is at a depth of 56 centimeters. Scale is in centimeters.

Btk2—56 to 88 centimeters; light yellowish brown (10YR 6/4) very channery clay loam, light yellowish brown (10YR 6/4) moist; moderate coarse subangular blocky structure; friable, moderately sticky, moderately plastic; 25 percent clay films on all faces of peds; carbonate masses; 5 percent flat angular 151- to 380-millimeter, 10 percent flat angular 2- to 5-millimeter, and 30 percent flat angular 6- to 150-millimeter calcareous shale fragments; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—88 centimeters; indurated shale.

Range in Characteristics

Soil moisture: Soil is dry in all parts from about mid-April or May until mid-November or December and is usually moist at some depth the rest of the year

Mean annual soil temperature: 17 to 20 degrees C
Depth to bedrock: 60 to 125 cm to lithic calcareous shale or, less commonly, limestone
Calcium carbonate equivalent: Ranging from 1 to 40 percent and increasing with depth; greater than 15 percent in some part of the lower B horizon
Clay content: 35 to 55 percent in the particle-size control section

A horizon:
Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/1, 2/2, 3/1, 3/2, or 3/3
Reaction—slightly alkaline or moderately alkaline
Calcium carbonate—slightly to strongly effervescent; some pedons do not have carbonate in the surface horizon
Texture—clay loam or clay

Btk or Bk horizons:
Dry color—2.5Y or 10YR 4/2, 4/3, 5/3, 5/4, 6/2, 6/3, or 6/4
Moist color—2.5Y or 10YR 3/1, 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/4, or 6/4
Reaction—slightly alkaline or moderately alkaline
Calcium carbonate—strongly or violently effervescent
Texture—clay or clay loam
Rock fragments—as much as 65 percent channers in lower part of horizons in some pedons

R layer:
Bedrock—violently effervescent, moderately hard to indurated, fractured calcareous shale or limestone

Ballona Series

The Ballona series consists of well drained soils that formed in alluvium from mixed sources. These soils are on alluvial fans, inset fans, and flood plains. Slopes range from 0 to 9 percent. The mean annual precipitation is about 445 millimeters, and the mean annual air temperature is about 18 degrees C.

Taxonomic Classification

Fine, smectitic, thermic Calcic Pachic Haploxerolls

Typical Pedon

Ballona loam in an area of Urban land-Grommet-Ballona complex, 0 to 5 percent slopes; Los Angeles County, California; Van Nuys/Sherman Oaks Recreation Center, Los Angeles, 90 meters west of Hazeltine Avenue and 15 meters south of cinder wall; 34 degrees 9 minutes 47.2 seconds N. latitude and 118 degrees 26 minutes 28.2 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Van Nuys, California. (Colors are for dry soil unless otherwise noted.)

^A1—0 to 7 centimeters; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; hard, friable, moderately sticky, moderately plastic; common very fine irregular pores; slightly alkaline, pH 7.6; clear wavy boundary.
^A2—7 to 30 centimeters; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, firm, very sticky, very plastic; common very fine irregular pores; common distinct pressure faces on all peds; slightly alkaline, pH 7.6; clear wavy boundary.
2AB1—30 to 70 centimeters; brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; very hard, firm,

very sticky, very plastic; common very fine irregular pores; many distinct pressure faces on all peds; slightly alkaline, pH 7.8; gradual wavy boundary.

2AB2—70 to 90 centimeters; dark yellowish brown (10YR 4/4) clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure; very hard, firm, very sticky, very plastic; common very fine irregular pores; many distinct pressure faces on all peds; finely disseminated calcium carbonate; slightly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

2Bk1—90 to 120 centimeters; dark yellowish brown (10YR 4/4) clay, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; very hard, firm, very sticky, very plastic; common very fine irregular pores; common medium irregular calcium carbonate masses and few medium prominent spherical weakly cemented calcium carbonate nodules in matrix; strongly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

2Bk2—120 to 200 centimeters; yellowish brown (10YR 5/4) clay, brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard, firm, very sticky, very plastic; common medium irregular calcium carbonate masses and few medium spherical weakly cemented calcium carbonate nodules in matrix; violently effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Soil temperature: 18 to 21 degrees C

Rock fragment content: 0 to 5 percent

Reaction: Slightly alkaline or moderately alkaline

Depth to secondary calcium carbonate: 20 to 120 cm from the mineral surface; typically within 65 cm of the top of the natural soil surface if it is covered with a thin mantle of human-transported materials

Clay content: More than 35 percent in the particle-size control section

Thickness of human-transported materials: 0 to 50 cm

A or ^Au horizons:
Dry color—10YR 3/1, 3/2, 3/3, 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/2, 3/1, 3/2, or 3/3
Texture—loam, clay loam, silty clay loam, or clay or, less commonly, sandy loam
Artifacts—0 to 5 percent construction debris

AB or 2AB horizons:
Dry color—10YR 4/3, 4/4, 5/2, 5/3, 6/2, or 6/3
Moist color—10YR 2/2, 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—clay loam, clay, or silty clay
Clay content—35 to 45 percent
Pressure faces—some pedons have common or many pressure faces on peds

Bss, 2Bss, Bkss, or 2Bkss horizon (if it occurs):
Dry color—10YR, 4/2, 4/3, 5/2, 5/3, 5/4, or 6/2
Moist color—10YR 2/2, 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—clay loam, clay, or silty clay
Clay content—35 to 45 percent
Pressure faces—common or many pressure faces on peds
Slickensides—few or common intersecting slickensides

Bk or 2Bk horizons:
Dry color—10YR 4/4, 5/3, 5/4, 6/3, or 6/4
Moist color—10YR 3/2, 3/3, 3/4, 4/3, or 4/4

Figure 17.—An area of Biscailuz soil at California State Polytechnic University in Pomona, at the university farm next to Valley Boulevard.

Texture—clay loam, clay, silty clay, or silty clay loam
Clay content—30 to 45 percent
Pressure faces—some pedons have common to many pressure faces on peds
Calcium carbonate equivalency—less than 12 percent

Biscailuz Series

The Biscailuz series consists of very deep, somewhat poorly drained soils that formed in alluvium from mixed rock sources. These soils are on flood plains and lowlands (fig. 17). Slopes range from 0 to 5 percent. The mean annual precipitation is about 410 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Oxyaquic Haploxerolls

Typical Pedon

Biscailuz loam in an area of Urban land-Biscailuz-Pico complex, 0 to 2 percent slopes; Los Angeles County, California; California State Polytechnic University in Pomona, university farm, 340 meters south of farm road entrance on Valley Boulevard and 120 meters west of San Jose Creek, Pomona; 34 degrees 2 minutes 15 seconds N. latitude and 118 degrees 49 minutes 5 seconds W. longitude, NAD 83 – U.S.G.S. Quad: San Dimas, California. When described, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Ap—0 to 32 centimeters; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; common fine interstitial and common very fine tubular pores; finely disseminated carbonate; 1 percent rounded 2- to 75-millimeter fragments; strongly effervescent; slightly alkaline, pH 7.5; clear smooth boundary.

Bk1—32 to 70 centimeters; light brownish gray (2.5Y 6/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; friable, moderately sticky, moderately plastic; common very fine tubular pores; finely disseminated carbonate and 7 percent fine distinct threadlike light brownish gray

(10YR 6/2) carbonate masses; 1 percent rounded 2- to 75-millimeter fragments; strongly effervescent; slightly alkaline, pH 7.5; clear wavy boundary.

Bk2—70 to 95 centimeters; light yellowish brown (2.5Y 6/3) loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium subangular blocky structure; friable; common very fine tubular pores; 12 percent medium distinct threadlike gray (10YR 6/1) carbonate masses; 1 percent rounded 2- to 75-millimeter rock fragments; violently effervescent; slightly alkaline, pH 7.5; clear wavy boundary.

Bkg—95 to 125 centimeters; light brownish gray (2.5Y 6/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; friable; common very fine tubular pores; 2 percent medium distinct irregular light olive brown (2.5Y 5/6) masses of oxidized iron; 8 percent medium distinct irregular gray (10YR 6/1) carbonate masses; 1 percent rounded 2- to 75-millimeter rock fragments; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C1—125 to 145 centimeters; light yellowish brown (2.5Y 6/3) sandy loam, light olive brown (2.5Y 5/3) moist; massive; friable; 5 percent medium distinct irregular light olive brown (2.5Y 5/6) masses of oxidized iron; 2 percent rounded 2- to 75-millimeter rock fragments; moderately alkaline, pH 8.0; clear wavy boundary.

C2—145 to 200 centimeters; light yellowish brown (2.5Y 6/4) sand, light olive brown (2.5Y 5/4) moist; 4 percent clay; massive; loose; 1 percent coarse distinct irregular light olive brown (2.5Y 5/6) masses of oxidized iron; 5 percent rounded 2- to 75-millimeter rock fragments; moderately alkaline, pH 8.0.

Range in Characteristics

Soil moisture: Soil is seasonally saturated, unless drained, within 100 cm of the surface some time between October and December and remains moist in some part between depths of about 30 to 90 centimeters until April or May; soil is dry the remainder of the year

Mean annual soil temperature: 18 to 20 degrees C

Rock fragment content: 0 to 5 percent

Reaction: Neutral to moderately alkaline

Calcium carbonate: Finely disseminated carbonate and/or masses in the A or B horizon; some pedons have disseminated carbonate in the C horizon

Depth to redoximorphic features: 35 to 100 cm to iron concentrations; more than 75 cm to iron depletions with chroma of 2 or less

A, Ap, ^A, or ^Au horizon:

Dry color—10YR or 2.5Y 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR or 2.5Y 2/2, 3/1, 3/2, or 3/3
Texture—loam, silt loam, silty clay loam, or clay loam
Clay content—18 to 33 percent
Artifacts—0 to 3 percent innocuous construction debris

Bk or Bkg horizons:

Dry color—2.5Y or 10YR 4/2, 4/3, 5/2, 5/3, 5/4, 6/2, or 6/3
Moist color—2.5Y or 10YR 2/2, 3/2, 3/3, 4/2, 5/2, or 5/3
Texture—loam, clay loam, silty clay loam, or sandy clay loam
Pressure faces—some horizons have pressure faces on peds
Clay content—18 to 33 percent

C or Cg horizons:

Dry color—2.5Y to 10YR 5/2, 5/3, 5/4, 6/1, 6/2, 6/3, 7/1, or 7/2
Moist color—2.5Y or 10YR 3/1, 3/2, 4/2, 4/3, 5/2, 5/3, or 5/4
Texture—loamy sand, sandy loam, or sand; some horizons are stratified and have thin lenses with finer texture
Clay content—3 to 15 percent

Blasingame Series

The Blasingame series consists of moderately deep, well drained soils that formed in material weathered from basic igneous rocks. These soils are on foothills and uplands. Slopes range from 9 to 75 percent. The mean annual precipitation is about 520 millimeters, and the mean annual air temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs

Typical Pedon

Blasingame loam, 9 to 30 percent slopes; Orange County, California (within the Soil Survey of Orange County and Western Part of Riverside County, California); Santiago Truck Trail about 0.5 mile east of Morrow Road; 33 degrees 41 minutes 34.42 seconds N. latitude and 117 degrees 35 minutes 19.31 seconds W. longitude. (Colors are for dry soil unless otherwise noted.)

A—0 to 15 centimeters; weak red (7.5R 4/4) loam, dark brown (7.5YR 3/2) moist; moderate medium granular and moderate thick platy structure; friable, slightly hard, slightly sticky, slightly plastic; common fine, medium, coarse, and very fine tubular pores; 3 percent angular 76- to 250-millimeter and 4 percent angular 2- to 75-millimeter metamorphic rock fragments; neutral, pH 6.7; clear wavy boundary.

Bt—15 to 61 centimeters; strong brown (7.5YR 5/6) clay loam, strong brown (7.5YR 4/8) moist; strong medium and strong coarse angular blocky structure; firm, very hard, very sticky, very plastic; common fine and very fine tubular pores; distinct clay films on all faces of peds; 3 percent angular 76- to 250-millimeter and 4 percent angular 2- to 75-millimeter metamorphic rock fragments; moderately acid, pH 5.7; abrupt wavy boundary.

Cr—61 to 86 centimeters; moderately cemented bedrock.

Range in Characteristics

Soil moisture: Soil between depths of about 5 and 15 inches usually is moist in some or all parts from November or early December until late April or May and is dry the rest of the year

Mean annual soil temperature: 18 to 21 degrees C

Depth to paralithic contact: 50 to 100 cm

Rock fragments: 0 to 10 percent, by volume, stones

A horizon:

Color—7.5YR or 5YR 3/2, 3/3, 3/4, 4/3, 4/4, 5/2, 5/3, or 5/4

Texture—sandy loam, fine sandy loam, or loam

Clay content—15 to 25 percent

Organic matter content—less than 1 percent or 1 to 2 percent in only the upper 1 to 3 inches

Bt horizon:

Color—7.5YR or 5YR 3/4, 4/4, 4/6, 4/8, 5/4, 5/6, 4/8, or 5/6; lower part of horizon has hue of 2.5YR in some pedons

Texture—clay loam or sandy clay loam

Clay content—27 to 35 percent clay and about 4 to 10 percent more absolute clay than the A horizon

Boades Series

The Boades series consists of well drained soils that are shallow to soft bedrock and that formed in residuum and colluvium derived from sandstone and conglomerate.

Figure 18.—An area of Boades soil under dense chaparral at the Puente Hills Native Habitat Nature Preserve in Whittier, California.

These soils are on hills and mountains (fig. 18). Slopes range from 15 to 75 percent. The mean annual precipitation is about 416 millimeters, and the mean annual air temperature is about 18 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, thermic, shallow Entic Haploxerolls

Typical Pedon

Boades sandy loam in an area of Soper-Pachic Haploxerolls-Boades complex, 25 to 75 percent slopes; Los Angeles County, California; Puente Hills Native Habitat Nature Preserve off Hellman Trail, 15 meters east of connecting side trail near spur ridge junction; 33 degrees 59 minutes 52.00 seconds N. latitude and 118 degrees 1 minute 45.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Whittier, California. When described, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

A1—0 to 2 centimeters; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; very friable, soft, slightly sticky, nonplastic; neutral, pH 6.8; clear wavy boundary.

A2—2 to 38 centimeters; yellowish brown (10YR 5/4) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; very friable, slightly sticky, nonplastic; 5 percent 2- to 5-millimeter, 5 percent 76- to 250-millimeter, and 10 percent 6- to 75-millimeter sandstone fragments; neutral, pH 6.8; abrupt wavy boundary.

Cr—38 to 53 centimeters; weakly cemented sandstone.

Range in Characteristics

Soil moisture: Soil is moist in some part from about mid-November or December to mid-April or May; soil is dry in all parts the rest of the year

Mean annual soil temperature: 18 to 21 degrees C

Figure 19.—An area of Bolsa soil on a drained flood plain in Los Cerritos Wetlands.

Depth to paralithic contact: 25 to 50 cm
Organic matter content: 2 to 4 percent

A horizons:
- Dry color—10YR 3/2, 3/3, 4/2, 4/3, 5/3, or 5/4
- Moist color—10YR 2/2, 3/1, 3/2, or 3/3
- Texture—sandy loam, loam, or clay loam in upper part of horizon and gravelly in lower part
- Rock fragment content—0 to 10 percent in upper part of horizon and 10 to 30 percent in lower part

Bolsa Series

The Bolsa series consists of somewhat poorly soils that are typically drained and that formed in mixed alluvium of coastal areas. These soils are on flood plains and alluvial fans of the lower coastal plain (fig. 19). Slopes range from 0 to 2 percent. The mean annual precipitation is about 340 millimeters, and the mean annual air temperature is about 17.2 degrees C.

Taxonomic Classification

Fine-silty, mixed, superactive, calcareous, thermic Aquic Xerofluvents

Typical Pedon

Bolsa silt loam, drained; Orange County, California; Huntington Beach, 100 meters west and 30 meters north of northwest corner of intersection of Magnolia and Atlanta Avenues; 33 degrees 39 minutes 28.00 seconds N. latitude and 117 degrees 58 minutes 17.00 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Newport Beach, California. (Colors are for dry soil unless otherwise noted.)

Ap1—0 to 15 centimeters; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine roots; common fine tubular pores; strongly effervescent, disseminated lime; moderately alkaline, pH 8.0; abrupt smooth boundary.

Ap2—15 to 30 centimeters; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine and common medium roots; common fine tubular pores; strongly effervescent, disseminated lime; moderately alkaline, pH 8.0; clear smooth boundary.

C1—30 to 45 centimeters; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; few very faint mottles; weak medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine and common medium roots; common fine tubular pores; strongly effervescent, disseminated lime; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—45 to 74 centimeters; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; few fine and common medium roots; common fine tubular pores; strongly effervescent, disseminated lime; moderately alkaline, pH 8.0; abrupt smooth boundary.

C3—74 to 100 centimeters; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; few fine prominent reddish yellow (7.5YR 6/6) mottles, strong brown (7.5YR 5/6) moist; weak fine and medium prismatic structure; very hard, firm, sticky, plastic; few fine and common medium roots; common fine tubular pores; salts in fine threads; strongly effervescent, disseminated lime; moderately alkaline, pH 8.0; clear smooth boundary.

C4—100 to 125 centimeters; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; common fine prominent reddish yellow (7.5R 6/6) mottles, strong brown (7.5YR 5/6) moist; weak fine and medium prismatic structure; very hard, firm, sticky, plastic; few fine roots; common fine tubular pores; salts in fine threads; strongly effervescent, disseminated lime; moderately alkaline, pH 8.0; clear smooth boundary.

C5—125 to 140 centimeters; light brownish gray (2.5Y 6/2) and dark gray (2.5Y 4/1) silty clay loam with a high content of organic matter, dark grayish brown (2.5Y 4/2) and dark gray (2.5Y 4/1) moist; common fine prominent reddish yellow (7.5YR 6/6) mottles, strong brown (7.5YR 5/6) moist; weak coarse prismatic structure; very hard, very firm, very sticky, plastic; few fine and medium roots; many fine tubular pores; moderately alkaline, pH 8.0; clear smooth boundary.

C6—140 to 175 centimeters; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; many fine prominent brownish yellow (10YR 6/6) mottles, yellowish brown (10YR 5/6) moist; moderate fine platy structure; hard, firm, sticky, plastic; common fine pores; salts in fine threads; moderately alkaline, pH 8.0.

Range in Characteristics

Soil moisture (in nonirrigated areas): Soil between depths of 10 and 30 cm usually is moist in some part from some time in November until some time in May and is dry the rest of the year

Water table: Soil is saturated within 100 to 150 cm of the surface from about February to May, unless drained; in drained areas, the water table is typically at a depth of 150 cm or more

Mean annual soil temperature: 17 to 20 degrees C

Thickness of human-transported materials: 0 to 50 cm

Calcium carbonate: Soil is calcareous to a depth of 100 cm or more

Reaction: Slightly alkaline or moderately alkaline

Clay content: 18 to 30 percent clay; less than 15 percent fine sand or coarser particles
Organic matter content: Decreasing irregularly as depth increases
Note: Many pedons have a buried A horizon

A horizons:
Dry color—10YR to 5Y 5/2, 6/2, or 6/3
Moist color—10YR to 5Y 3/2, 4/2, or 4/3
Texture—silt loam, loam, sandy loam, silty clay loam, or clay loam

C horizons:
Dry color—10YR to 5Y 4/1, 5/2, 6/2, 6/3, 7/1, or 7/2
Moist color—10YR to 5Y 4/1, 4/2, 5/2, 5/3, or 6/2
Texture—typically silt loam or silty clay loam that has lenses of coarser or finer material
Redoximorphic features—distinct or prominent masses of iron concentration and iron depletions below a depth of about 75 cm

Buzzpeak Series

The Buzzpeak series consists of deep, somewhat excessively drained soils that formed in material weathered from sandstone or conglomerate. These soils are on steep and unstable hills (fig. 20). Slopes range from 35 to 90 percent. The mean annual precipitation is about 460 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Sandy, mixed, thermic Typic Haploxerepts

Figure 20.—An area of Buzzpeak soils. Steep, jagged slopes are the result of loose, sandy material on unstable slopes.

Figure 21.—Representative profile of the Buzzpeak series. This soil consists of sand and loamy sand weathered from conglomerate. Gravel content increases as depth increases. Scale is in centimeters.

Typical Pedon (fig. 21)

Buzzpeak gravelly sandy loam in an area of Soper-Buzzpeak association, 35 to 75 percent slopes; Los Angeles County, California; Buzzard Peak, on a steep side slope of northwest finger mid-slope above landslide; 34 degrees 3 minutes 33 seconds N. latitude and 117 degrees 50 minutes 53 seconds W. longitude, NAD 83 – U.S.G.S. Quad: San Dimas, California. When described, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

A—0 to 13 centimeters; dark yellowish brown (10YR 4/4) gravelly sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky, nonplastic; common fine roots throughout; many very fine low-continuity interstitial pores; 5 percent subrounded indurated 76- to 250-millimeter, 10 percent subangular indurated 2- to 5-millimeter, and 10 percent subangular indurated 6- to 75-millimeter sandstone fragments; moderately acid, pH 6.0; abrupt wavy boundary.
Bw1—13 to 34 centimeters; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky, nonplastic; common very fine and common fine roots throughout; common very fine interstitial pores; 1 percent subrounded indurated 76- to 250-millimeter, 10 percent subangular indurated 2- to 5-millimeter, and 10 percent subangular indurated 6- to 75-millimeter sandstone fragments; moderately acid, pH 6.0; clear wavy boundary.
Bw2—34 to 44 centimeters; dark yellowish brown (10YR 4/4) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky, nonplastic; common very fine roots throughout; common very fine interstitial pores; 1 percent subrounded indurated 76- to 250-millimeter, 7 percent subangular indurated 2- to 5-millimeter, and 8 percent subangular indurated 6- to 75-millimeter sandstone fragments; slightly acid, pH 6.5 by Hellige-Truog; clear wavy boundary.
C1—44 to 61 centimeters; brownish yellow (10YR 6/6) gravelly sand, yellowish brown (10YR 5/6) moist; single grain; loose, loose, nonsticky, nonplastic; common very fine and common medium roots throughout; common very fine interstitial pores; 1 percent subangular indurated 76- to 250-millimeter, 10 percent subangular indurated 6- to 75-millimeter, and 20 percent subangular indurated 2- to 5-millimeter sandstone fragments; slightly acid, pH 6.5; clear wavy boundary.
C2—61 to 117 centimeters; brownish yellow (10YR 6/6) very gravelly sand, yellowish brown (10YR 5/4) moist; single grain; loose, loose, nonsticky, nonplastic; common very fine roots throughout; common very fine interstitial pores; 5 percent subrounded indurated 75- to 250-millimeter, 18 percent subrounded indurated 6- to 75-millimeter, and 20 percent rounded indurated 2- to 5-millimeter sandstone fragments; slightly acid, pH 6.5; abrupt smooth boundary.
Cr—117 to 203 centimeters; weakly cemented conglomerate sandstone with cracks more than 10 centimeters apart.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between November and December and remains moist in some part between depths of about 30 to 90 cm until April or May
Mean annual soil temperature: 19 to 22 degrees C
Depth to paralithic contact: 100 to 150 cm
Clay content: 1 to 8 percent
Reaction: Slightly acid to neutral
Calcium carbonate: None
Surface fragments: 0 to 25 percent gravel and few cobbles

A horizon:
Dry color—2.5Y or 10YR 4/4, 5/2, 5/3, 5/4, or 6/3
Moist color—2.5Y or 10YR 3/2, 3/3, 4/2, or 4/3
Texture—sandy loam, loamy sand, or sand
Rock fragment content—5 to 35 percent

Bw horizons:
Dry color—2.5Y or 10YR 4/4, 5/3, 5/4, 5/6, 6/3, or 6/4

Moist color—2.5Y or 10YR 4/4, 5/4, 5/6, or 6/4
Texture—loamy sand, sand, or sandy loam; typically gravelly
Rock fragment content—5 to 35 percent

C horizons:
Dry color—2.5Y or 10YR 5/4, 5/6, or 6/6
Moist color—2.5Y or 10YR 4/4, 5/4, 5/6, 6/4, or 6/6
Texture—sand or loamy sand; typically gravelly or very gravelly
Rock fragment content—10 to 65 percent

Cr horizon:
Texture—weathered sandstone or conglomerate

Calcic Haploxerepts

Calcic Haploxerepts consist of very deep, well drained soils that formed in material weathered from sandstone. These soils are on terrace risers. Slopes range from 10 to 35 percent. The mean annual precipitation is about 368 millimeters, and the mean annual air temperature is about 17.8 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Calcic Haploxerepts

Typical Pedon (fig. 22)

Calcic Haploxerepts in an area of Calcic Haploxerepts-Longshore-Urban land complex, 10 to 35 percent slopes; Los Angeles County, California; San Pedro, on a steep side slope of hill east of Gaffey Street at Leland Park; 33 degrees 45 minutes 7.13 seconds N. latitude and 118 degrees 17 minutes 36.10 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Torrance, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 9 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; strong fine granular structure; very friable, slightly hard, nonsticky, nonplastic; common fine and very fine roots; many fine interstitial pores; finely disseminated carbonate; 2 percent subrounded weakly cemented 2- to 75-millimeter sandstone fragments; slightly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

A2—9 to 22 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) and dark grayish brown (10YR 4/2) moist; strong fine granular and weak medium subangular blocky structure; very friable, moderately hard, nonsticky, nonplastic; common very fine roots; few medium and many very fine tubular pores; finely disseminated carbonate and 1 percent prominent irregular white (10YR 8/1) carbonate masses in matrix; slightly effervescent; slightly alkaline, pH 7.8; clear broken boundary.

Bk1—22 to 72 centimeters; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; very friable, moderately hard, nonsticky, nonplastic; few very fine roots; many fine irregular and common medium tubular pores; finely disseminated carbonate and 1 percent prominent irregular white (10YR 8/1) carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Bk2—72 to 130 centimeters; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; friable, slightly hard, nonsticky, nonplastic; many fine irregular pores; finely disseminated carbonate and 8 percent medium prominent irregular white (10YR 8/1) carbonate masses in matrix; 5 percent subrounded weakly cemented 2- to 75-millimeter sandstone fragments; strongly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Figure 22.—Representative profile of Calcic Haploxerepts, on a terrace riser at Leland Park in San Pedro. Scale is in centimeters.

Bk3—130 to 155 centimeters; very pale brown (10YR 7/4) fine sandy loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; very friable, nonsticky, nonplastic; finely disseminated carbonate and 1 percent prominent irregular white (10YR 8/1) carbonate masses in matrix; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk4—155 to 200 centimeters; very pale brown (10YR 7/4) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; very friable, nonsticky, nonplastic; 5 percent fine prominent irregular yellowish brown (10YR 5/6) and 5 percent medium distinct

irregular yellowish brown (10YR 5/4) iron-manganese masses in matrix; finely disseminated carbonate and 1 percent prominent irregular white (10YR 8/1) carbonate masses in matrix; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Note: These soils are mapped at the subroup level due to their small extent and variable properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 20 degrees C

A horizons:
Dry color—10YR 5/2, 5/3, 6/2, or 6/3
Moist color—10YR 3/2, 3/3, 4/2, or 4/3
Texture—loam or sandy loam
Clay content—8 to 12 percent
Calcium carbonate—finely disseminated carbonate

Bk horizons:
Dry color—10YR 5/3, 5/4, 6/3, 6/4, 7/3, or 7/4
Moist color—10YR 4/3, 4/4, 5/3, 5/4, or 6/4
Texture—loam, sandy loam, or loamy sand
Clay content—4 to 12 percent
Calcium carbonate—few or common carbonate masses and disseminated carbonate

Calleguas Series

The Calleguas series consists of very shallow and shallow, well drained soils that formed in residuum weathered from sedimentary rocks. These soils are on crests and side slopes of hills. Slope range from 20 to 75 percent. The mean annual precipitation is about 400 millimeters, and the mean annual air temperature is about 18 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, calcareous, thermic, shallow Typic Xerorthents

Typical Pedon

Calleguas clay loam, 50 to 75 percent slopes, eroded; Orange County, California; Irvine Ranch, along Buck Gully about 1/4 mile northeast of Pacific Coast Highway, Corona Del Mar; 33 degrees 35 minutes 52.29 seconds N. latitude and 117 degrees 51 minutes 25.66 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Laguna Beach, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 18 centimeters; pale brown (10YR 6/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium and fine granular structure; friable, slightly hard, moderately sticky, moderately plastic; many fine and very fine roots; many fine and very fine tubular pores; finely disseminated carbonate; 10 percent flat angular indurated 2- to 150-millimeter calcareous shale fragments; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

A2—18 to 28 centimeters; pale brown (10YR 6/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium and fine granular structure; very friable, slightly hard, moderately sticky, moderately plastic; many very fine roots; common very fine pores; finely disseminated carbonate; 10 percent flat angular indurated

2- to 150-millimeter calcareous shale fragments; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

A3—28 to 38 centimeters; pale brown (10YR 6/3) channery clay loam, dark grayish brown (10YR 4/2) moist; weak medium and fine granular structure; very friable, slightly hard, moderately sticky, moderately plastic; many very fine roots; few fine and many very fine pores; finely disseminated carbonate; 35 percent flat angular indurated 2- to 150-millimeter calcareous shale fragments; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Cr—38 to 107 centimeters; moderately cemented sedimentary bedrock.

Range in Characteristics

Soil moisture: Soil below a depth of about 13 cm is usually dry all of the time from April or May until November or December and is moist in some or all parts the rest of the year

Mean annual soil temperature: 18 to 21 degrees C

Depth to paralithic contact: 20 to 50 cm to calcareous sedimentary bedrock

Calcium carbonate: Slightly to violently effervescent throughout the profile

Calcium carbonate equivalency: Less than 8 percent

Reaction: Slightly alkaline or moderately alkaline

Rock fragments: 5 to 35 percent, with the highest percentages directly above the paralithic contact; typically small angular and subangular shale channers 6 to 15 mm in diameter

A horizons:

Dry color—10YR 6/2, 6/3, 5/2, or 5/3 or 2.5Y 6/2

Moist color—10YR 4/2, 4/3, or 4/4 or 2.5Y 4/2

Texture—loam, clay loam, silty clay loam, or channery texture

Bw horizons (if they occur):

Dry color—10YR 5/3, 5/4, 6/3, or 6/4

Moist color—10YR 4/3, 4/4, 5/3, or 5/4

Texture—loam, fine sandy loam, or channery texture

Caperton Family

The Caperton family consists of very shallow and shallow, well drained soils that formed in material weathered from metamorphic, granitic, and sedimentary rocks. These soils are on mountainsides and ridges (fig. 23). Elevation ranges from 220 to 810 meters. Slopes range from 50 to 85 percent. The mean annual precipitation is about 620 millimeters, and the mean annual air temperature is 15 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, thermic, shallow Entic Haploxerolls

Typical Pedon

Caperton family gravelly loam in an area of Caperton-Trigo, granitic substratum-Lodo families complex, 50 to 85 percent slopes; Los Angeles County, California; 0.5 mile south of Bear Divide on Little Tujunga Canyon Road, 70 yards north of highway marker 8.89 and 30 feet upslope; 34 degrees 21 minutes 23.41 seconds N. latitude and 118 degrees 23 minutes 15.20 seconds W. longitude, NAD 83 – U.S.G.S. Quad: San Fernando, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 8 centimeters; dark grayish brown (10YR 4/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine and moderate very fine granular structure; very friable, soft, nonsticky, nonplastic; common fine and common very fine roots; many

Figure 23.—Location of representative profile of the Caperton family in the Angeles National Forest.

fine and very fine interstitial pores; 15 percent nonflat subangular indurated 2- to 76-millimeter gneiss fragments; neutral, pH 6.6; clear smooth boundary.

A2—8 to 43 centimeters; brown (10YR 4/3) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine, weak medium, and weak coarse granular structure; very friable, soft, slightly sticky, slightly plastic; 15 percent nonflat subangular indurated 2- to 76-millimeter gneiss fragments; slightly acid, pH 6.4; clear wavy boundary.

Cr—43 to 68 centimeters; dark yellowish brown (10YR 4/4) moderately cemented sandstone bedrock with few medium, fine, and very fine roots in cracks.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 15 to 22 degrees C at the contact

Reaction: Moderately acid to neutral (pH 5.6 to 7.3)

Depth to paralithic contact: 10 to 50 cm

A horizons:

Dry color—10YR 5/4, 5/3, 5/2, 4/4, 4/3, 4/2, or 3/3 or 2.5Y 4/2
Moist color—10YR 3/3, 3/2, or 2/2 or 7.5YR 3/2
Texture—loam, gravelly loam, sandy loam, fine sandy loam, or silt loam
Rock fragments—0 to 30 percent gravel

C horizon (if it occurs):

Dry color—10YR 6/6, 6/2, 5/4, 5/3, or 4/3 or 5Y 6/3

Moist color—10YR 4/4, 4/3, 3/4, or 3/2; 2.5Y 4/2; or 7.5YR 3/2
Texture—sandy loam, fine sandy loam, gravelly sandy loam, gravelly loam, or silt loam
Rock fragments—5 to 30 percent gravel
Note—some pedons have a thin layer that grades into the weathered rock

Capistrano Series

The Capistrano series consists of very deep, well drained soils that formed in alluvium from sedimentary or granitic sources. These soils are on alluvial fans and flood plains in valleys. Slopes range from 0 to 9 percent. The mean annual precipitation is about 460 millimeters, and the mean annual air temperature is about 17.8 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Entic Haploxerolls

Typical Pedon

Capistrano fine sandy loam in an area of Capistrano-Urban land complex, 0 to 2 percent slopes; Los Angeles County, California; Van Nuys, 750 feet west and 60 feet north of the intersection of Sepulveda Boulevard and Sherman Way; 34 degrees 12 minutes 5 seconds N. latitude and 118 degrees 28 minutes 8 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Van Nuys, California. (Colors are for dry soil unless otherwise noted.)

Ap—0 to 8 centimeters; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; friable, slightly hard, slightly sticky, slightly plastic; many very fine roots; many very fine interstitial pores; slightly acid, pH 6.5; gradual smooth boundary.

A1—8 to 51 centimeters; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; friable, slightly hard, slightly sticky, slightly plastic; many fine and very fine roots; common very fine to medium tubular pores; neutral, pH 7.0; gradual wavy boundary.

A2—51 to 104 centimeters; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; friable, slightly hard, slightly sticky, slightly plastic; many fine and very fine roots; common fine, few medium, and many very fine tubular pores; neutral, pH 7.3; gradual wavy boundary.

C—104 to 183 centimeters; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; massive; friable, slightly hard, slightly sticky, slightly plastic; few fine and very fine roots; many fine and very fine and few medium tubular pores; slightly alkaline, pH 7.8.

Range in Characteristics

Soil moisture: Soil between depths of 20 and 65 cm is continuously dry in all parts from late April or May until late October and is usually moist in some part the rest of the year
Mean annual soil temperature: 18 to 21 degrees C
Texture: Sandy loam, coarse sandy loam, or fine sandy loam or, less commonly, loam; less than 18 percent clay; texture is generally homogenous throughout the profile
Rock fragments: 0 to 6 percent rounded gravel that are less than 75 mm in diameter; in a few exceptions, pedons have up to 25 percent gravel

A horizons:
Dry color—10YR 3/2, 3/3, 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/2, 3/2, or 3/3

Organic matter content—1.5 to 3 percent in the upper 25 cm; decreasing gradually to less than 1 percent within a depth of 50 cm
Structure—weak granular or weak subangular blocky
Reaction—neutral or slightly acid

C horizon:
Soil properties—similar to A horizon, but horizon is lighter in color and is massive

Centinela Series

The Centinela series consists of well drained soils that formed in a thin surface mantle of human-transported materials (HTM) overlying alluvium from marine or mixed rock sources. These soils are on alluvial fan remnants, inset fans, fluviomarine bottoms, and low-lying terraces. Slopes range from 0 to 9 percent. The mean annual precipitation is about 342 millimeters, and the mean annual air temperature is about 17.2 degrees C.

Taxonomic Classification

Fine, smectitic, thermic Vertic Haploxerepts

Typical Pedon (fig. 24)

Centinela loam in an area of Urban land-Centinela-Typic Xerorthents, fine substratum complex, 0 to 2 percent slopes; Los Angeles County, California; City of Hawthorne, Jim Thorpe Park, in grassy area between ballfield outfield fences; 33 degrees 54 minutes 15.62 seconds N. latitude and 118 degrees 20 minutes 33.36 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Inglewood, California. (Colors are dry soil unless otherwise noted.)

^A—0 to 7 centimeters; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; friable, slightly hard, slightly sticky, slightly plastic; slightly alkaline, pH 7.4; abrupt smooth boundary.

^Cu—7 to 43 centimeters; pale brown (10YR 6/3) loam, 5 percent yellowish brown (10YR 5/6) and 95 percent brown (10YR 4/3) moist; weak medium subangular blocky structure; friable, moderately hard, moderately sticky, moderately plastic; few 2- to 75-millimeter artifacts; few yellowish brown (10YR 5/6) pockets from mechanical mixing; soil structure is a remnant of the source material; slightly alkaline, pH 7.6; abrupt smooth boundary.

2Bss—43 to 95 centimeters; very dark grayish brown (10YR 3/2) clay, very dark brown (10YR 2/2) moist; weak coarse prismatic structure; firm, very sticky, very plastic; common slickensides and many pressure faces on peds; slightly alkaline, pH 7.8; gradual wavy boundary.

2Bkss—95 to 140 centimeters; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; firm, very sticky, very plastic; common slickensides and many pressure faces on peds; common fine irregular calcium carbonate masses; strongly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

2Bk—140 to 155 centimeters; brown (10YR 5/3) clay loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; firm, very sticky, very plastic; common fine distinct dark yellowish brown (10YR 4/6) iron-manganese masses and common fine faint grayish brown (10YR 5/2) iron depletions; few fine irregular calcium carbonate masses; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Figure 24.—Representative profile of the Centinela series. A layer of human-transported materials overlies the darker genetic subsoil at a depth of about 43 centimeters. Scale is in centimeters.

Mean annual soil temperature: 17 to 20 degrees C
Rock fragment content: 0 to 5 percent
Reaction: Slightly alkaline or moderately alkaline
Secondary calcium carbonate: Typically below 55 cm within the natural subsurface material; typically absent in the natural soil at the contact between the HTM and the natural subsoil
Slickensides: Within a depth of 75 cm of the surface; typically within 50 cm of the contact between the HTM and the natural subsoil
Clay content: More than 35 percent in the particle-size control section
Thickness of human-transported materials: Less than 50 cm
Artifacts: 0 to 10 percent construction debris in the HTM

^A horizon:
Dry color—10YR 3/2, 3/3, 4/2, 4/3, 4/4, 5/2, 5/3, 5/4, or 6/3
Moist color—10YR 2/2, 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—loam, clay loam, sandy loam, or silt loam

^C or ^Cu horizon (if it occurs):
Dry color—10YR 4/2, 4/3, 4/4, 5/4, 5/6, 6/3, or 6/4
Moist color—10YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, or 5/4

Figure 25.—Location of representative profile of the Chilao family in the Angeles National Forest.

Texture—loam, clay loam, sandy loam, or silt loam
Artifacts—0 to 10 percent

B or 2B horizons:
Dry color—10YR 3/2, 3/3, 4/2, 4/3, 5/2, 5/3, 5/4, or 6/4
Moist color—10YR 2/2, 3/1, 3/2, 3/3, 4/2, 4/3, 5/3, or 5/4
Texture—clay or clay loam

Chilao Family

The Chilao family consists of very shallow or shallow, somewhat excessively drained soils that formed in material weathered from anorthosite, granodiorite, or metamorphic rocks. These soils are on mountainsides and ridges (fig. 25). Elevation ranges from 447 to 1,795 meters. Slopes range from 20 to 85 percent. Annual precipitation ranges from 520 to 950 millimeters.

Taxonomic Classification

Loamy-skeletal, mixed, superactive, nonacid, thermic, shallow Typic Xerorthents

Typical Pedon

Chilao family gravelly loam in an area of Chilao-Trigo, granitic substratum-Lodo families complex, 55 to 85 percent slopes; Los Angeles County, California; 0.9 mile northeast of Monte Cristo Fire Station on the Angeles Forest Highway, 50 feet uphill from marker 15.87; 34 degrees 20 minutes 6.42 seconds N. latitude and 118 degrees

6 minutes 49.05 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Chilao Flat, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 13 centimeters; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; very friable, soft, nonsticky, nonplastic; few fine roots; many fine and many very fine interstitial pores; 20 percent nonflat subangular indurated 2- to 76-millimeter anorthosite fragments; slightly acid, pH 6.4; clear wavy boundary.

C—13 to 46 centimeters; light yellowish brown (10YR 6/4) extremely gravelly loam, yellowish brown (10YR 5/4) moist; massive; friable, soft, slightly sticky, slightly plastic; few fine and few medium roots; common fine interstitial pores; 60 percent nonflat subangular indurated 2- to 76-millimeter anorthosite fragments; neutral, pH 6.8; clear wavy boundary.

Cr—46 to 71 centimeters; moderately cemented sandstone bedrock; few fine roots in cracks.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Depth to paralithic contact: 15 to 48 cm

Soil temperature: 15 to 22 degrees C at the paralithic contact

Reaction: Moderately acid to neutral (pH 5.6 to 7.3)

A horizon:

Dry color—10YR 6/2, 5/4, 5/3, 5/2, or 4/3 or 5Y 6/2

Moist color—10YR 4/3, 4/2, 3/3, or 3/2 or 5Y 4/2

Texture—gravelly loam, very gravelly loam, cobbly loam, gravelly sandy loam, or very gravelly sandy loam

Rock fragments—20 to 40 percent

C horizon:

Dry color—10YR 6/4, 6/3, 5/5, or 4/4 or 5Y 6/3

Moist color—10YR 5/6, 5/4, 4/3, or 3/4 or 5Y 5/2

Texture—very gravelly loam, very cobbly loam, very gravelly sandy loam, or very gravelly clay loam

Rock fragments—40 to 65 percent

Note—horizon grades into a Cr horizon

Chino Series

The Chino series consists of somewhat poorly drained soils that formed in alluvium derived from material weathered from mostly sedimentary sources. These soils are on flood plains. Slopes range from 0 to 2 percent. The mean annual precipitation is about 330 millimeters, and the mean annual temperature is about 17.8 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Aquic Haploxerolls

Typical Pedon

Chino silty clay loam, drained; Orange County, California; Irvine Ranch; 33 degrees 42 minutes 1.95 seconds N. latitude and 117 degrees 48 minutes 27.10 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Tustin, California. (Colors are for dry soil unless otherwise noted.)

Ap1—0 to 8 centimeters; gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; weak fine granular structure; friable, hard, moderately sticky, moderately plastic; common very fine roots; common fine and common very fine tubular pores; finely disseminated carbonate; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Ap2—8 to 33 centimeters; gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium angular blocky and weak medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; very few fine and common very fine roots; common fine and very fine tubular pores; finely disseminated carbonate; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

A—33 to 61 centimeters; gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; light brownish gray (2.5Y 6/2) and dark grayish brown (2.5Y 4/2) mottles; weak medium angular blocky and weak medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; very few fine and common very fine roots; common fine and very fine and few medium tubular pores; finely disseminated carbonate; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C1—61 to 74 centimeters; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; light brownish gray (2.5Y 6/2) and dark grayish brown (2.5Y 4/2) mottles; massive; friable, hard, moderately sticky, moderately plastic; common very fine roots; few fine and common very fine tubular pores; finely disseminated carbonate and medium distinct threadlike carbonate masses; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—74 to 94 centimeters; gray (10YR 6/1) silty clay loam, dark gray (10YR 4/1) moist; massive; friable, hard, moderately sticky, moderately plastic; few very fine roots; common fine and very fine tubular pores; finely disseminated carbonate; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C3—94 to 119 centimeters; light gray (10YR 7/1) silty clay loam, gray (10YR 5/1) moist; massive; firm, hard, moderately sticky, moderately plastic; very few very fine roots; common very fine tubular pores; finely disseminated carbonate; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C4—119 to 152 centimeters; gray (10YR 6/1) and light gray (2.5Y 7/2) sandy clay loam, dark gray (10YR 4/1) and dark grayish brown (2.5Y 4/2) moist; massive; friable, hard, moderately sticky, moderately plastic; common fine and very fine tubular pores; finely disseminated carbonate; violently effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Soil moisture: Soil is seasonally saturated, unless drained, within 100 to 150 cm of the surface some time from about February to May; soil between a depth of about 10 and 30 cm is moist from some time in November or December until some time in April or May and is dry the rest of the year

Mean annual soil temperature: 18 to 21 degrees C

Redoximorphic features: Faint to distinct masses of oxidized iron and iron depletions within a depth of 100 cm

Clay content: 27 to 35 percent

Reaction: Slightly acid to moderately alkaline

A horizon:

Dry color—10YR 4/2, 4/3, 5/1, 5/2, or 5/3
Moist color—10YR 2/2, 3/1, 3/2, or 3/3
Structure—weak to strong, fine to medium granular
Texture—silty clay loam or clay loam

C horizon:

Dry color—10YR or 2.5Y 5/1, 5/2, 5/3, 6/1, 6/2, 7/1, or 7/2
Moist color—10YR or 2.5Y 3/2, 4/1, 4/2, 5/1, 5/2, or 5/3
Texture—silty clay loam, clay loam, or sandy clay loam

Chualar Series

The Chualar series consists of very deep, well drained soils that formed in alluvium weathered from mixed rock sources. These soils are on terraces and alluvial fans. Slopes range from 0 to 9 percent. The mean annual precipitation is about 420 millimeters, and the mean annual temperature is about 17.9 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Typic Argixerolls

Typical Pedon

Chualar sandy loam in an area of Chualar-Urban land complex, 2 to 9 percent slopes; Los Angeles County, California; 900 feet east and 500 feet north of the southeast corner of section 27, T. 2 N., R. 17 W.; 34 degrees 13 minutes 17.38 seconds N. latitude and 118 degrees 38 minutes 42.73 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Calabasas, California. (Colors are for dry soil unless otherwise noted.)

Ap—0 to 8 centimeters; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; friable, slightly hard, nonsticky, nonplastic; common very fine roots; common very fine interstitial pores; neutral, pH 7.0; clear smooth boundary.

A—8 to 48 centimeters; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; friable, slightly hard, nonsticky, nonplastic; common very fine roots; common very fine tubular pores; neutral, pH 7.0; clear wavy boundary.

Bt1—48 to 112 centimeters; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/2) moist; weak coarse subangular blocky structure; firm, hard, moderately sticky, moderately plastic; common very fine roots; few medium, fine, and very fine tubular pores; 40 percent faint clay films on surfaces along pores and 40 percent faint clay films on all faces of peds; slightly alkaline, pH 7.5; clear smooth boundary.

Bt2—112 to 178 centimeters; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/2) moist; weak coarse subangular blocky structure; firm, hard, moderately sticky, moderately plastic; common fine and very fine roots; common very fine tubular pores; 70 percent distinct clay films on surfaces along pores and 70 percent distinct clay bridges between sand grains; slightly alkaline, pH 7.8; clear smooth boundary.

C—178 to 208 centimeters; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; massive; firm, hard, slightly sticky, moderately plastic; few fine and very fine roots; common very fine tubular pores; 15 percent faint clay films on surfaces along pores and 15 percent faint clay bridges between sand grains; slightly alkaline, pH 7.6.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C
Rock fragments: 0 to 15 percent; dominantly fine gravel
Calcium carbonate: Some pedons have finely disseminated carbonate in the C horizon and the lower Bt horizon

A horizon:
Dry color—10YR 4/2, 4/3, or 5/3
Moist color—10YR 2/2, 3/3, 3/1, 3/2, or 3/3
Texture—clay loam or loam
Structure—weak or moderate granular or subangular blocky and slightly hard or hard
Organic matter content—1 to 4 percent to a depth of more than 25 cm; decreasing regularly and less than 1 percent at a depth of 50 cm
Reaction—slightly acid or neutral

Bt horizons:
Dry color—10YR or 7.5YR 4/3, 4/4, 5/3, 5/4, or 6/4
Moist color—10YR or 7.5YR 3/2, 3/3, 4/2, or 4/3
Texture—loam or clay loam
Clay content—27 to 35 percent
Reaction—neutral to moderately alkaline in upper part of horizon; moderately alkaline in lower part in some pedons

C horizon:
Dry color—10YR or 7.5YR 5/3, 5/4, 6/2, 6/3, 6/4, or 6/6
Moist color—10YR or 7.5YR 4/3, 4/4, 5/3, 5/4, or 5/6
Texture—loam or sandy loam; horizon can be stratified
Reaction—slightly alkaline or moderately alkaline

Chumash Series

The Chumash series consists of somewhat excessively drained soils that are very shallow and shallow to soft bedrock and that formed in residuum and colluvium derived from shale and sandstone. These soils are on hills and mountains. Slopes range from 5 to 75 percent. The mean annual precipitation is about 464 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, nonacid, thermic, shallow Typic Xerorthents

Typical Pedon

Chumash sandy loam in an area of Gaviota-Chumash-Rock outcrop complex, 20 to 55 percent slopes; Los Angeles County, California; on a hillside above Suzanne Avenue in Walnut, on a side slope of an isolated hill; 34 degrees 2 minutes 4.00 seconds N. latitude and 117 degrees 51 minutes 7.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: San Dimas, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 12 centimeters; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; friable, slightly hard, slightly sticky, nonplastic; common very fine tubular pores; 1 percent subangular 2- to 5-millimeter, 1 percent subangular 6- to 75-millimeter, and 2 percent subrounded 76- to 250-millimeter sandstone fragments; neutral, pH 6.8; abrupt wavy boundary.

A2—12 to 25 centimeters; pale brown (10YR 6/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; friable, slightly hard, slightly sticky, nonplastic; common very fine tubular pores; 3 percent subangular 2- to 5-millimeter, 5 percent subrounded 76- to 250-millimeter, and 7 percent subangular 6- to 75-millimeter sandstone fragments; neutral, pH 6.8; abrupt smooth boundary.

Cr—25 to 50 centimeters; moderately cemented sandstone.

Range in Characteristics

Soil moisture: Soil is moist from about November or December until about April or May
Depth to paralithic bedrock: 20 to 50 cm to moderately cemented sandstone
Mean annual soil temperature: 18 to 21 degrees C

A horizons:
Dry color—10YR 5/2, 5/3, 5/4, 6/2, or 6/3
Moist color—10YR 3/2, 3/3, 3/4, 4/2, or 4/3
Texture—sandy loam or gravelly directly overlying bedrock
Rock fragments—0 to 15 percent in upper part of horizon; up to 35 percent in lower part

Cieneba Series

The Cieneba series consists of very shallow and shallow, somewhat excessively drained soils that formed in material weathered from diorite and granitic rocks. These soils are on hills and mountains (fig. 26). Slopes range from 10 to 85 percent. The mean annual precipitation is about 520 millimeters, and the mean annual temperature is about 17.8 degrees C.

Figure 26.—An area of Cieneba soil with chaparral, along the shoulder of a spur ridge next to the Las Flores Motorway in Glendale.

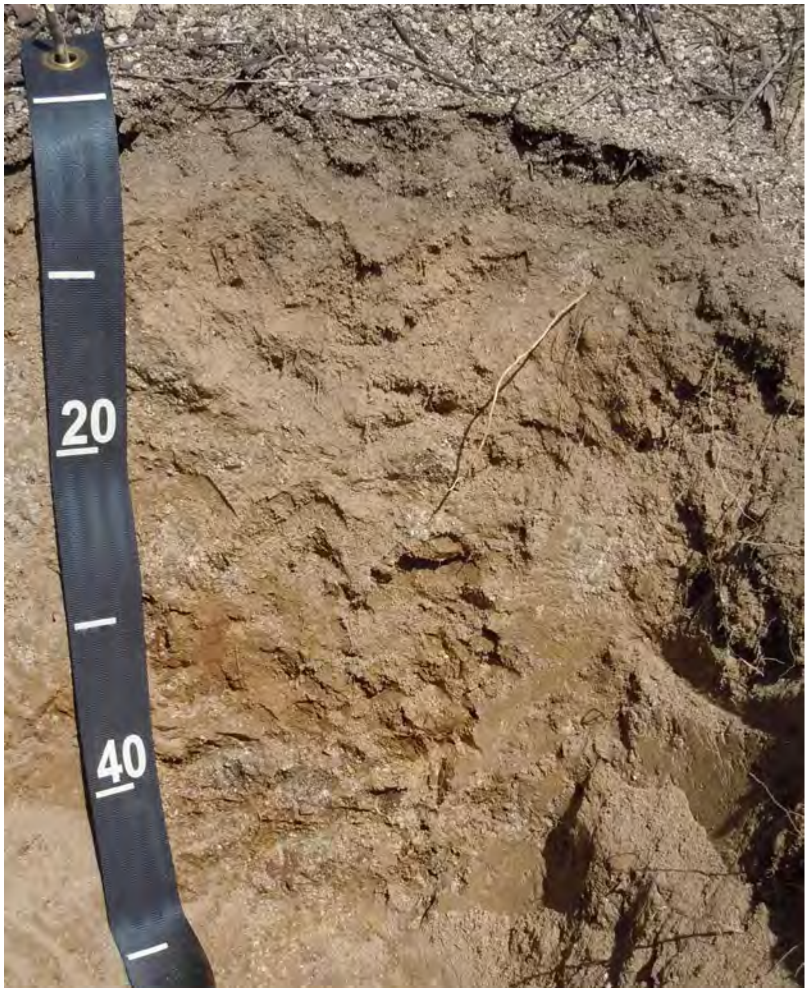


Figure 27.—Representative profile of the Cieneba series. A paralithic contact is at a depth of 40 centimeters. Scale is in centimeters.

Taxonomic Classification

Loamy, mixed, superactive, nonacid, thermic, shallow Typic Xerorthents

Typical Pedon (fig. 27)

Cieneba sandy loam in an area of Vista-Cieneba complex, 30 to 85 percent slopes; Los Angeles County, California; Glendale, Verdugo Mountain, Las Flores Motorway, downslope from lower turnout beyond road disturbance on shoulder of spur; 34 degrees 10 minutes 52.00 seconds N. latitude and 118 degrees 14 minutes 54.00 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Pasadena, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 11 centimeters; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; very friable, soft, nonsticky, nonplastic; common very fine and medium roots; common very fine interstitial and common very fine tubular pores; 1 percent subangular 6- to 75-millimeter and 2 percent subangular 2- to 5-millimeter diorite fragments; neutral, pH 7.2; clear wavy boundary.

A2—11 to 19 centimeters; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; very friable, soft, slightly sticky, nonplastic;

common very fine roots; common very fine tubular pores; 2 percent subangular 6- to 75-millimeter and 3 percent subangular 2- to 5-millimeter diorite fragments; neutral, pH 7.2; gradual wavy boundary.

C1—19 to 30 centimeters; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; friable, moderately hard, slightly sticky, nonplastic; common very fine roots; common very fine tubular and common very fine interstitial pores; 2 percent subangular 6- to 75-millimeter and 3 percent subangular 2- to 5-millimeter diorite fragments; slightly alkaline, pH 7.4 (Phenol red); clear wavy boundary.

C2—30 to 40 centimeters; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; massive; friable, moderately hard, slightly sticky, nonplastic; common very fine roots; 2 percent subangular 6- to 75-millimeter and 3 percent subangular 2- to 5-millimeter diorite fragments; slightly alkaline, pH 7.4; clear wavy boundary.

Cr—40 to 65 centimeters; moderately cemented monzodiorite.

Range in Characteristics

Soil moisture: Soil at a depth of 10 cm or more is moist from some time in November or December until some time in April or May and is dry the rest of the year
Mean annual soil temperature: 18 to 21 degrees C
Depth to paralithic bedrock: 18 to 50 cm
Reaction: Slightly acid to slightly alkaline
Clay content: Typically 7 to 12 percent; always less than 18 percent
Rock fragment content: 0 to 15 percent
Organic matter content: Less than 1 percent below a depth of 10 to 15 cm

A horizons:
Dry color—10YR 3/2, 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 3/2, 3/3, 4/2, or 4/3
Texture—sandy loam
Clay content—typically 7 to 12 percent; always less than 18 percent

C horizons (if they occur):
Dry color—10YR 5/4, 5/6, 6/3, 6/4, or 7/4
Moist color—10YR 4/3, 4/4, 5/4, or 5/6
Texture—sandy loam

Cr horizon:
Texture—extremely weakly cemented to moderately cemented bedrock

Conejo Series

The Conejo series consists of very deep, well drained soils that formed in young alluvium weathered from mostly sandstone and shale. These soils are on alluvial fans and in narrow valleys on the valley floor. Slopes range from 0 to 9 percent. The mean annual precipitation is about 440 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls

Typical Pedon

Conejo clay loam in an area of Conejo-Urban land complex, 0 to 2 percent slopes; Los Angeles County, California; 100 feet north and 100 feet west of the intersection of Gloria and Stagg Streets; 34 degrees 12 minutes 50.94 second N. latitude and

118 degrees 28 minutes 46.73 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Van Nuys, California. (Colors are for dry soil unless otherwise noted.)

Ap—0 to 5 centimeters; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; friable, hard, moderately sticky, moderately plastic; many very fine roots; many very fine interstitial pores; slightly acid, pH 6.5; clear smooth boundary.

A1—5 to 51 centimeters; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; friable, hard, moderately sticky, moderately plastic; few fine and common very fine roots; few fine tubular, many very fine interstitial, and many very fine tubular pores; slightly acid, pH 6.5; clear smooth boundary.

A2—51 to 89 centimeters; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; few fine and common very fine roots; few fine and many very fine tubular pores; slightly alkaline, pH 7.5; clear wavy boundary.

C1—89 to 157 centimeters; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; massive; friable, hard, moderately sticky, moderately plastic; few fine and few very fine roots; common fine tubular and many very fine tubular pores; moderately alkaline, pH 8.0; clear wavy boundary.

C2—157 to 190 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; massive; friable, slightly hard, slightly sticky, slightly plastic; few very fine roots; few medium and many very fine tubular pores; fine threadlike carbonate masses and fine irregular carbonate concretions in matrix; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C
Thickness of mollic epipedon: More than 50 cm
Calcium carbonate: Soil is noncalcarous to a depth of 150 cm or more
Rock fragment content: Less than 10 percent throughout the profile

A horizons:
Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/2, 3/1, 3/2, or 3/3
Texture—clay loam
Reaction—slightly acid to slightly alkaline

C horizons:
Dry color—10YR 5/2, 5/3, 5/4, 6/2, 6/3, or 7/3
Moist color—10R 4/2, 4/3, 4/4, or 5/3
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline

Cotharin Series

The Cotharin series consists of well drained soils that are very shallow or shallow to fractured bedrock and that formed in residuum and colluvium derived from basalt. These soils are on hills and mountains. Slopes range from 20 to 75 percent. The mean annual precipitation is about 476 millimeters, and the mean annual temperature is about 18.3 degrees C.

Figure 28.—Representative profile of the Cotharin series, in Griffith Park on a south-facing slope above the observatory. Scale is in centimeters.

Taxonomic Classification

Loamy, smectitic, thermic, shallow Entic Haploxerolls

Typical Pedon (fig. 28)

Cotharin loam in an area of Cotharin-Rock outcrop complex, 30 to 75 percent slopes; Los Angeles County, California; Griffith Park, on south-facing slope of basaltic knob, 720 meters north of the northern boundary of the Griffith Observatory parking lot; 34 degrees 7 minutes 39.24 seconds N. latitude and 118 degrees 18 minutes 2.48 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Burbank, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 6 centimeters; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; friable, soft; many very fine roots; few fine tubular pores; neutral, pH 6.8; clear wavy boundary.

AB—6 to 21 centimeters; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; friable, soft, moderately sticky,

slightly plastic; many very fine roots; 10 percent angular weakly cemented 2- to 75-millimeter basalt fragments; neutral, pH 7.2; clear wavy boundary.

Cr—21 to 46 centimeters; weakly cemented basalt.

Range in Characteristics

Soil moisture: Soil is moist from some time in November or December until some time in April or May and is dry the rest of the year
Mean annual soil temperature: 18 to 21 degrees C
Depth to paralithic contact: 15 to 50 cm
Rock fragment content: 0 to 15 percent
Organic matter content: 1 to 3 percent

A horizon or AB horizon (if it occurs):
Dry color—10YR 4/2 or 4/3
Moist color—10YR 3/2 or 3/3
Texture—loam
Clay content—18 to 26 percent

Counterfeit Series

The Counterfeit series consists of very deep soils that formed from human-transported materials (HTM) that originated from material weathered from calcareous sedimentary rocks. These soils are on manmade hillslope terraces (fig. 29). Slopes range from 0 to 15 percent on treads and up to 65 percent on risers. The mean annual precipitation is about 433 millimeters, and the mean annual temperature is about 18.5 degrees C.

Taxonomic Classification

Fine, spolic, smectitic, calcareous, thermic Typic Xerorthents

Figure 29.—An area of Counterfeit soil on a engineered hillslope terrace in the City of Walnut. The natural landscape has been completely reshaped. A terrace riser is visible to the right in photo.

Typical Pedon

Counterfeit clay loam in an area of Counterfeit-Urban land complex, 10 to 35 percent slopes, terraced; Los Angeles County, California; City of Walnut, Arroyo Park, 125 feet south of cut terrace on second tier; 34 degrees 1 minute 18.00 seconds N. latitude and 117 degrees 52 minutes 19.00 seconds W. longitude, WGS 84 – U.S.G.S. Quad: San Dimas, California. (Colors are for dry soil unless otherwise noted.)

^Au—0 to 13 centimeters; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium granular structure; friable, moderately sticky, very plastic; finely disseminated carbonate; 2 percent angular channers; channers are mostly from mechanically detached *in situ* paralithic bedrock; slightly effervescent; slightly alkaline, pH 7.5; abrupt wavy boundary.

^Cu1—13 to 46 centimeters; light yellowish brown (2.5Y 6/3) clay, olive brown (2.5Y 4/3) moist; massive; firm, very sticky, very plastic; common distinct pressure faces; common medium distinct irregular strong brown (7.5YR 5/6) masses of oxidized iron and common medium distinct irregular light brownish gray (10YR 6/2) iron depletions; common distinct carbonate masses in matrix; 8 percent channers; 1 percent 2- to 75-millimeter artifacts; channers are mostly from mechanically detached *in situ* paralithic bedrock; calcium carbonate masses are remnants of the source material, formed prior to transport; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

^Cu2—46 to 95 centimeters; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; massive; firm, very sticky, very plastic; many pressure faces; common medium distinct irregular yellowish brown (10YR 5/6) masses of oxidized iron and common medium distinct irregular light brownish gray (10YR 6/2) iron depletions; 1 percent channers; 1 percent 2- to 75-millimeter artifacts; strongly effervescent; channers are mostly from mechanically detached *in situ* paralithic bedrock; slightly alkaline, pH 7.5; abrupt wavy boundary.

^C1—95 to 145 centimeters; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; firm, very sticky, very plastic; common pressure faces; common medium prominent irregular yellowish red (5YR 4/6) masses of oxidized iron; common irregular pale brown (10YR 6/3) carbonate masses; 2 percent parachanners; channers are mostly from mechanically detached *in situ* paralithic bedrock; calcium carbonate masses are transported from the source material, formed prior to transport; strongly effervescent; slightly alkaline, pH 7.5; abrupt wavy boundary.

^C2—145 to 183 centimeters; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/6) moist; massive; friable, slightly sticky, slightly plastic; common coarse distinct yellowish brown (10YR 5/6) masses of oxidized iron and common medium distinct gray (2.5Y 6/1) iron depletions; slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May; soil is dry the rest of the year; when continuously irrigated, soil is moist throughout the year

Mean annual soil temperature: 18 to 20 degrees C; typically does not go below 8 degrees C

Human-transported materials: More than 200 cm thick or directly overlying bedrock

Rock fragments: 0 to 15 percent angular channers, mechanically detached and incorporated from *in situ* bedrock

Depth to bedrock: Typically greater than 150 cm

Redoximorphic features: Typically within a depth of 75 cm in continuously irrigated areas; nonirrigated land does not have redox features
Calcium carbonate equivalency: 0 to 10 percent
Reaction: Neutral to moderately alkaline
Colors: Multiple matrix colors are typical due to mechanical mixing
Artifacts: 0 to 10 percent construction debris

^A or ^Au horizon:
Dry color—10YR 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR 2/2, 3/2, 3/3, 3/4, 4/2, or 4/3
Texture—loam, clay loam, or clay
Clay content—20 to 44 percent

^C or ^Cu horizons:
Dry color—mixed matrix color of 2.5Y to 7.5YR 4/3, 4/4, 5/3, 5/4, 6/3, or 6/4
Moist color—mixed matrix color of 2.5Y to 7.5YR 3/2, 3/3, 4/3, 4/4, 4/6, or 5/3; 2.5Y to 7.5YR 5/4 or 6/3 in pulverized bedrock
Texture—clay loam, clay, silty clay, sandy clay loam, or loam
Clay content—30 to 55 percent

Cropley Series

The Cropley series consists of very deep, well drained soils that formed in alluvium weathered from sedimentary rocks. These soils are on alluvial fans and flood plains (fig. 30). Slopes range from 0 to 5 percent. The mean annual precipitation is about 410 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine, smectitic, thermic Aridic Haploxererts

Figure 30.—An area of Cropley soil in the Valinda neighborhood of La Puente, in a low position at the base of the San Jose Hills (visible in the distance).

Figure 31.—Representative profile of the Cropley series showing slickensides. In urban settings, most areas of Cropley soils are irrigated year-round, so cracks do not form during the dry months. (Scale is in centimeters.)

Typical Pedon (fig. 31)

Cropley clay loam in an area of Cropley-Urban land complex, 0 to 5 percent slopes; Los Angeles County, California; Community of Valinda, near the corner of Glengrary and Vanderwell Avenue, 100 feet from road, near soccer field; 34 degrees 1 minute 50.00 seconds N. latitude and 117 degrees 55 minutes 29.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Baldwin Park, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 11 centimeters; very dark grayish brown (10YR 3/2) clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; firm, very hard, very sticky, very plastic; common fine and medium roots throughout; neutral, pH 7.2; clear wavy boundary.

Bss—11 to 63 centimeters; very dark grayish brown (10YR 3/2) clay loam, black (10YR 2/1) moist; strong coarse prismatic structure parting to strong coarse subangular blocky; very firm, very hard, very sticky, very plastic; common very fine roots throughout; many very fine interstitial pores; 15 percent prominent slickensides (pedogenic) on faces of peds and 60 percent prominent clay films on all faces of

peds; 1 percent rounded 2- to 75-millimeter unspecified fragments; neutral, pH 6.9; gradual wavy boundary.

BCk1—63 to 140 centimeters; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong coarse subangular blocky structure; very firm, very hard, very sticky, very plastic; common very fine roots throughout; common very fine irregular and common very fine interstitial pores; 20 percent distinct pressure faces on peds and 30 percent distinct black (10YR 2/1), moist, clay films on all faces of peds; 5 percent fine distinct irregular pale brown (10YR 6/3), moist, carbonate masses in matrix; 1 percent 2- to 75-millimeter unspecified fragments; slightly effervescent; neutral, pH 7.3; gradual wavy boundary.

BCk2—140 to 200 centimeters; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; very firm, very hard, very sticky, very plastic; 25 percent distinct clay films on all faces of peds; 5 percent distinct irregular pale brown (10YR 6/3), moist, carbonate masses in matrix; 1 percent 2- to 75-millimeter unspecified fragments; slightly effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Calcium carbonate masses (if they occur): At depths ranging from 60 to 125 cm (in most pedons) to more than 200 cm

Clay content: 35 to 50 percent in the particle-size control section

Surface cracks: Although naturally occurring, they are typically not observed due to year-round irrigation or the presence of a thin layer of human-transported material at the surface

Reaction: Neutral to moderately alkaline

A or ^Au horizon:

Dry color—10YR or 2.5Y 3/2 or 4/2

Moist color—10YR or 2.5Y 2/1, 2/2, 3/1, or 3/2

Texture—clay loam or clay; coarser textured human-transported material is at the surface (for improved drainage) in some pedons

Clay content—35 to 50 percent

Rock fragments—0 to 5 percent gravel; some pedons have up to 15 percent gravel in human-transported material

Bss or Bkss horizon:

Dry color—10YR or 2.5Y 3/2, 4/2, 4/3, 5/2, or 5/3

Moist color—10YR or 2.5Y 2/1, 2/2, 3/1, 3/2, 3/3, or 4/2

Texture—clay loam or clay

Clay content—35 to 50 percent

Rock fragments—0 to 5 percent gravel

Slickensides—common or many on faces of peds

Calcium carbonate equivalency—less than 5 percent

BCk horizons:

Dry color—10YR or 2.5Y 4/2, 4/3, 5/2, 5/3, or 6/3

Moist color—10YR or 2.5Y 3/2, 3/3, 4/2, 4/3, or 5/3

Texture—clay loam or clay; some pedons have strata of loam or fine sandy loam below a depth of 100 cm

Clay content—27 to 50 percent

Rock fragments—0 to 5 percent gravel

Calcium carbonate equivalency—less than 5 percent

Figure 32.—An area of Cumulic Haploxerolls in Brentwood near Mandeville Canyon, on an incised alluvial fan. On the right in the photo is a steep escarpment from an alluvial fan remant, which extends into the Pacific Palisades.

Cumulic Haploxerolls

Cumulic Haploxerolls consist of very deep, well drained soils that formed in alluvium weathered from slate or related sedimentary rocks. These soils are on inset fans and flood plains (fig. 32). Slopes range from 2 to 9 percent. The mean annual precipitation is about 420 millimeters, and the mean annual temperature is about 17.2 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Cumulic Haploxerolls

Typical Pedon

Cumulic Haploxerolls in an area of Urban land-Cumulic Haploxerolls complex, 2 to 9 percent slopes; Los Angeles County, California; 120 meters south of intersection of Sunset Boulevard and Mandeville Canyon Road, in center of large recreational field; 34 degrees 3 minutes 33.92 seconds N. latitude and 118 degrees 29 minutes 39.24 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Beverly Hills, California. (Colors are for dry soil unless otherwise noted.)

^A1—0 to 17 centimeters; dark grayish brown (10YR 4/2) loam, 10 percent yellowish brown (10YR 5/4) and 90 percent dark brown (10YR 3/3) moist; weak fine granular structure; friable, moderately hard, slightly sticky, moderately plastic; 2 percent medium distinct irregular (2.5Y 4/6) iron-manganese masses in matrix; slightly alkaline, pH 7.6; clear wavy boundary.

A2—17 to 48 centimeters; dark grayish brown (10YR 4/2) channery loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; friable, moderately sticky, moderately plastic; 5 percent flat subrounded indurated 2- to 5-millimeter and 15 percent flat subrounded indurated 6- to 75-millimeter slate fragments; slightly alkaline, pH 7.6; clear wavy boundary.

C—48 to 150 centimeters; brown (10YR 5/3) channery loam, dark brown (10YR 3/3) moist; massive; friable, moderately sticky, moderately plastic; 5 percent flat subrounded indurated 2- to 5-millimeter and 20 percent flat subrounded indurated 6- to 75-millimeter slate fragments; slightly alkaline, pH 7.6.

Range in Characteristics

Note: These soils are mapped at the subroup level due to their small extent and variable properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 17 to 20 degrees C
Thickness of human-transported materials (HTM): Typically less than 25 cm; up to 75 cm in some pedons
Clay content: 18 to 26 percent throughout the profile
Rock fragments: 0 to 5 percent in the HTM; 15 to 35 percent slate channers in the natural subsoil
Organic matter content: 1 to 3 percent to a depth of more than 50 cm; decreasing irregularly with depth
Reaction: Slightly alkaline or moderately alkaline

^A or ^Au horizon:
Dry color—10YR 4/2, 4/3, or 5/3; pockets have higher value and chroma
Moist color—10YR 3/2 or 3/3; pockets have higher value and chroma
Texture—loam
Rock fragments—0 to 15 percent channers

A horizon:
Dry color—10YR 4/2, 4/3, or 5/3
Moist color—10YR 3/2 or 3/3
Texture—channery loam
Rock fragments—15 to 35 percent channers, mostly slate

C horizons:
Dry color—10YR 5/2, 5/3, or 6/3
Moist color—10YR 3/3, 4/2, or 4/3
Texture—horizon is channery loam or a stratified layer with fewer rock fragments
Rock fragments—15 to 35 percent channers, mostly slate

Dapplegray Series

The Dapplegray series consists of very deep, well drained soils that formed in human-transported materials (HTM) on engineered hillslope terraces in areas weathered from calcareous shale bedrock and other calcareous sedimentary rocks (figs. 33 and 34). The mean annual precipitation is about 383 millimeters, and the mean annual temperature is about 17 degrees C.

Taxonomic Classification

Fine-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents

Typical Pedon

Dapplegray fine sandy loam in an area of Urban land-Dapplegray complex, 5 to 20 percent slopes, terraced; Los Angeles County, California; Marilyn Ryan Park Sunset Park in Rancho Palos Verdes; 33 degrees 43 minutes 60 seconds N. latitude and 118 degrees 20 minutes 54 seconds W. longitude, WGS 84 – U.S.G.S. Quad: San Pedro, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 8 centimeters; brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; very friable, soft, nonsticky, nonplastic; common very fine roots; common very fine interstitial pores; finely

Figure 33.—An area of Dappleygray soil on a hillslope terrace in Ranch Palos Verdes, overlooking the marine terrace below and the Pacific Ocean. The hillside has been completely reshaped.

disseminated calcium carbonate; 1 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

^C—8 to 18 centimeters; pale yellow (2.5Y 7/3) fine sand, light olive brown (2.5Y 5/3) moist; single grain; loose, nonsticky, nonplastic; common very fine roots; few very fine irregular pores; finely disseminated calcium carbonate; 3 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

^Cu1—18 to 58 centimeters; light brown (7.5YR 6/3) gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate medium angular blocky structure; friable, hard, moderately sticky, moderately plastic; common very fine roots; common very fine irregular pores; common distinct clay films on all faces of peds; finely disseminated calcium carbonate; 25 percent gravel; 3 percent 2- to 75-millimeter artifacts; horizon structure and clay films are remnants of the source material, formed prior to transport; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

^Cu2—58 to 90 centimeters; light brown (7.5YR 6/3) gravelly clay loam, 70 percent dark brown (7.5YR 3/3) and 30 percent brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; friable, very hard; moderately sticky, moderately plastic; common very fine irregular pores; 25 percent distinct clay films on all faces of peds; finely disseminated calcium carbonate and common medium white (10YR 8/1) masses of calcium carbonate; 20 percent gravel; 3 percent 2- to 75-millimeter artifacts; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

^Cu3—90 to 140 centimeters; light brown (7.5YR 6/3) gravelly clay, 70 percent dark brown (7.5YR 3/3) and 30 percent brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; friable, very hard, very sticky, very plastic; common very fine irregular pores; many distinct clay films on all faces of peds; finely disseminated calcium carbonate and common white (10YR 8/1) masses of calcium carbonate; 20 percent gravel; 3 percent 2- to 75-millimeter artifacts; band of very dark brown (10YR 2/2) clay at depth of 140 cm; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

^Cu4—140 to 160 centimeters; pink (7.5YR 7/4) gravelly silty clay loam, strong brown (7.5YR 4/6) moist; weak medium subangular blocky structure; friable, very hard, moderately sticky, moderately plastic; common very fine irregular pores; many distinct clay films on all faces of peds; finely disseminated calcium carbonate and common medium white (10YR 8/1) masses of calcium carbonate; 15 percent gravel; slightly effervescent; moderately alkaline, pH 8.0.

Figure 34.—Profile of the Dapplegray series in an area of Urban land-Dapplegray complex, 5 to 20 percent slopes. Human-transported materials extend below a depth of 160 centimeters. Scale is in centimeters.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 17 to 20 degrees C

Thickness of human-transported materials: Typically more than 100 cm; commonly more than 200 cm

Rock fragments: Typically 10 to 35 percent; fragments were transported from the source material or detached from *in situ* bedrock; some pedons have less than 10 percent fragments
Reaction: Neutral to moderately alkaline
Artifacts: 0 to 10 percent construction debris

^A or ^Au horizons:
Dry color—2.5Y or 10YR 3/2, 3/3, 4/2, 4/3, 5/3, or 6/3
Moist color—2.5Y or 10YR 2/2, 3/1, 3/2, 4/2, or 4/3
Texture—fine sandy loam, loam, or silt loam
Clay content—18 to 35 percent
Rock fragments—0 to 15 percent
Artifacts—0 to 10 percent construction debris

^C or ^Cu horizon:
Dry color—mixed matrix of 2.5Y, 10YR, or 7.5YR 3/2, 4/3, 4/4, 5/3, 5/4, 6/2, 6/3, 7/3, 7/4, or 8/2
Moist color—mixed matrix of 10YR or 7.5YR 2/2, 3/1, 3/3, 3/4, 4/2, 4/3, 4/4, 4/6, 5/3, 6/4, or 7/2
Texture—loam, sandy loam, sandy clay loam, silt loam, or clay loam
Clay content—18 to 35 percent
Rock fragments—0 to 35 percent; fragments were transported from the source material or detached from *in situ* bedrock
Artifacts—0 to 10 percent construction debris; individual horizons contain 10 to 25 percent
Structure—all identified soil structure is a remnant of the source material, formed prior to human transport

Etsel Family

The Etsel family consists of very shallow, somewhat excessively drained soils that formed in material weathered from granitic rocks. These soils are on mountainsides. Elevation ranges from 352 to 1,867 meters. Slopes range from 50 to 80 percent. Annual precipitation ranges from 560 to 980 millimeters.

Taxonomic Classification

Loamy-skeletal, mixed, nonacid, mesic Lithic Xerorthents

Typical Pedon (fig. 35)

Etsel family gravelly loam in an area of Olete-Kilburn-Etsel families complex, 50 to 80 percent slopes; Los Angeles County, California; in the Rankin Peak area, 30 feet above Forest Road 2N31, about 1 mile off the Red Box-Rincon Road; 34 degrees 12 minutes 32.28 seconds N. latitude and 117 degrees 58 minutes 47.11 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Azusa, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 10 centimeters; gray (10YR 6/1) gravelly loam, dark gray (10YR 4/1) moist; weak medium granular structure; friable, soft, nonsticky, nonplastic; few fine and common medium roots; many very coarse and many very fine interstitial pores; 20 percent nonflat subangular indurated 2- to 76-millimeter granodiorite fragments; slightly acid, pH 6.4; abrupt smooth boundary.
C—10 to 23 centimeters; light gray (10YR 7/2) extremely gravelly sandy loam, brown (10YR 4/3) moist; massive; very friable, soft, nonsticky, nonplastic; few fine and common medium roots; many fine and many very fine interstitial pores; 5 percent nonflat subangular indurated 76- to 250-millimeter and 75 percent nonflat

Figure 35.—Location of representative profile of the Etsel family in the Angeles National Forest.

subangular indurated 2- to 76-millimeter granodiorite fragments; slightly acid, pH 6.3; clear wavy boundary.
R—23 to 48 centimeters; indurated granodiorite.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 8 to 15 degrees C at lithic contact
Depth to lithic contact: 13 to 23 cm
Reaction: Moderately acid or slightly acid (pH 5.6 to 6.5)

A horizon:
Dry color—10YR 6/3, 6/1, or 5/3
Moist color—10YR 4/4, 4/1, or 3/2
Texture—gravelly loam, gravelly sandy loam, or very cobbly sandy loam
Rock fragment content—20 to 45 percent
Note—horizon lies directly over hard bedrock in some pedons

C horizon:
Dry color—10YR 7/2 or 6/3
Moist color—10YR 5/3 or 4/3
Texture—very gravelly coarse sandy loam or extremely gravelly sandy loam
Rock fragment content—40 to 80 percent

Figure 36.—Location of representative profile of the Exchequer family in the Angeles National Forest.

Exchequer Family

The Exchequer family consists of very shallow or shallow, somewhat excessively drained soils that formed in material weathered from granitic, metamorphic, or sedimentary rocks. These soils are on ridgetops and mountainsides. Elevation ranges from 550 to 1,675 meters. Slopes range from 30 to 85 percent. Annual precipitation ranges from 255 to 635 millimeters.

Taxonomic Classification

Loamy, mixed, superactive, nonacid, thermic Lithic Xerorthents

Typical Pedon (fig. 36)

Exchequer family sandy loam in an area of Vista-Cieneba complex, 30 to 85 percent slopes (as a minor component); Los Angeles County, California; approximately 0.25 mile along a fire road, southwest of Beaudry Road, west of signal tower in the Verdugo Hills; 34 degrees 11 minutes 12.00 seconds N. latitude and 118 degrees 15 minutes 34.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Burbank, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 21 centimeters; light yellowish brown (10YR 6/4) sandy loam, brown (10YR 4/3) moist; 8 percent clay; weak fine granular and weak medium subangular blocky structure; nonsticky, nonplastic; 2 percent indurated 2- to 5-millimeter fragments; neutral, pH 7.2; abrupt wavy boundary.

R—21 to 46 centimeters; indurated diorite.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order

4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Depth to lithic contact: 12 to 48 cm
Mean annual soil temperature: 15 to 22 degrees C
Rock fragments: 5 to 30 percent; mainly less than 18 cm in diameter
Reaction: Slightly acid to mildly alkaline (pH 6.1 to 7.8)

A horizon:
Dry color—10YR 6/4, 6/3, 5/4, 5/3, 4/3, or 4/2 or 2.5Y 6/2 or 5/2
Moist color—10YR 5/3, 4/4, 4/3, 4/2, 3/4, or 3/3 or 2/5Y 4/4
Texture—sandy loam, coarse sandy loam, or loam; may be gravelly

C horizon (if it occurs):
Dry color—10YR 7/3, 6/4, or 5/4
Moist color—10YR 6/2 or 4/3
Texture—cobbly sandy loam or gravelly coarse sandy loam

Fallbrook Series

The Fallbrook series consists of deep, well drained soils that formed in material weathered from granitic rocks. These soils are on hills and mountain slopes (fig. 37). Slopes range from 10 to 75 percent. The mean annual precipitation is about 520 millimeters, and the mean annual temperature is about 18 degrees C.

Figure 37.—An area of Fallbrook soil at the base of the Verdugo Mountains. Verdugo soils occur on the lower, less steep foothills, on lower slopes, and on some north-facing slopes.

Figure 38.—Representative profile of Fallbrook series. Photo taken in La Crescenta along the Whiting Woods Fire Road. Scale is in centimeters.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs

Typical Pedon (fig. 38)

Fallbrook sandy loam in an area of Vista-Fallbrook-Cieneba complex, 30 to 75 percent slopes; Los Angeles County, California; Whiting Woods Fire Road, 500 meters beyond the gate above the road; 34 degrees 12 minutes 48.56 seconds N. latitude and 118

degrees 15 minutes 19.61 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Burbank, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 9 centimeters; brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 3/3) moist; weak medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; few fine tubular and many very fine interstitial pores; 2 percent subangular 6- to 75-millimeter diorite fragments and 3 percent subangular 2- to 5-millimeter diorite fragments; neutral, pH 7.2; clear wavy boundary.

A2—9 to 47 centimeters; light brown (7.5YR 6/3) sandy loam, brown (7.5YR 4/4) moist; strong coarse subangular blocky structure; friable, moderately hard, slightly sticky, slightly plastic; many very fine interstitial and common very fine tubular pores; faint clay bridges between sand grains; 2 percent subangular 6- to 75 millimeter and 3 percent subangular 2- to 5-millimeter diorite fragments; neutral, pH 7.2; clear wavy boundary.

Bt1—47 to 80 centimeters; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; friable, very hard, moderately sticky, moderately plastic; few fine tubular and many very fine interstitial pores; distinct yellowish red (5YR 4/6) clay films on all faces of peds; 2 percent subangular 2- to 75-millimeter diorite fragments; neutral, pH 7.2; gradual wavy boundary.

Bt2—80 to 110 centimeters; reddish yellow (7.5YR 6/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; friable, very hard, very sticky, moderately plastic; few very fine tubular and many very fine interstitial pores; prominent yellowish red (5YR 4/6) clay films on all faces of peds; 2 percent subangular 2- to 5-millimeter diorite fragments; slightly alkaline, pH 7.4; gradual wavy boundary.

Bt3—110 to 148 centimeters; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; friable, very hard, moderately sticky, moderately plastic; common very fine interstitial pores; prominent yellowish red (5YR 4/6) clay films on all faces of peds; 2 percent subangular 2- to 5-millimeter diorite fragments; neutral, pH 7.2; clear wavy boundary.

Cr—148 to 173 centimeters; moderately cemented diorite.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Depth to paralithic contact: 100 to 150 cm

Rock fragments: 0 to 15 percent diorite gravel throughout the profile

Reaction: Neutral or slightly alkaline

A horizons:

Dry color—7.5YR or 10YR 4/3, 4/4, 5/3, 5/4, or 6/3
Moist color—7.5YR or 10YR 3/2, 3/3, 3/4, or 4/4
Texture—sandy loam or loam
Clay content—12 to 16 percent

Bt horizons:

Dry color—5YR or 7.5YR 4/6, 5/4, 5/6, 6/4, or 6/6
Moist color—5YR or 7.5YR 3/4, 4/4, 4/6, or 5/6
Texture—sandy clay loam, clay loam, or loam
Clay content—20 to 32 percent clay
Sand fraction—typically 15 to 28 percent coarse and very coarse sand

Figure 39.—An area of Filiorum soil on a marine terrace on the Palos Verdes Peninsula. Photo taken at the Palos Verdes Estates Shoreline Preserve, looking north at the coastal sand dune in Redondo Beach and Hermosa Beach.

Filiorum Series

The Filiorum series consists of deep and very deep, well drained soils that formed in material weathered from calcareous shale. These soils are on nearly level to moderately sloping marine terraces (fig. 39). Slopes range from 0 to 20 percent. The mean annual precipitation is about 340 millimeters, and the mean annual temperature is about 17 degrees C.

Taxonomic Classification

Fine, smectitic, thermic Aridic Haploxererts

Typical Pedon (fig. 40)

Filiorum clay in an area of Urban land-Filiorum complex, 2 to 9 percent slopes; Los Angeles County, California; open space at Palos Verdes Estates Shoreline Preserve, southwest of intersection of Epping Street and Paseo Del Mar; 33 degrees 46 minutes 40 seconds N. latitude and 118 degrees 25 minutes 25 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Redondo Beach, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 12 centimeters; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate coarse subangular blocky structure; firm, hard, very sticky, very plastic; common very fine roots; common fine tubular and very fine interstitial pores; finely disseminated calcium carbonate; 2 percent channers; slightly effervescent; slightly alkaline, pH 7.5; abrupt wavy boundary.

Bkss—12 to 80 centimeters; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong coarse prismatic structure; firm, very hard, very sticky, very plastic; few very fine roots; common fine tubular pores; few slickensides and many pressure faces on all peds; common medium prominent irregular white (10YR 8/1) calcium carbonate masses in matrix; 2 percent channers; slightly effervescent; slightly alkaline, pH 7.6; gradual wavy boundary.

Figure 40.—Surface cracks at the representative profile location of the Filiorum series. The cracks will close temporarily during the wet season.

Bk1—80 to 150 centimeters; dark grayish brown (10YR 3/1) clay, very dark gray (10YR 3/1) moist; strong coarse prismatic structure; firm, very hard, very sticky, very plastic; common fine tubular pores; many pressure faces on peds; finely disseminated calcium carbonate and common medium prominent irregular white (10YR 8/1) calcium carbonate masses in matrix; slightly effervescent; slightly alkaline, pH 7.6; gradual wavy boundary.

Bk2—150 to 170 centimeters; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate coarse subangular blocky structure; firm, very hard, very sticky, very plastic; common pressure faces on peds; common medium prominent irregular white (10YR 8/1) calcium carbonate masses in matrix; slightly effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 17 to 19 degrees C
Depth to lithic bedrock: More than 120 cm; typically more than 150 cm
Rock fragment content: 0 to 15 percent throughout the profile
Secondary calcium carbonate: Within a depth of 10 to 95 cm; distinct to prominent irregular or threadlike masses
Reaction: Neutral to moderately alkaline
Linear extensibility: 6 to 9 percent
Clay content: 35 to 55 percent in the particle-size control section
Slickensides: Within a depth of 5 to 45 cm or directly below a thin surface mantle of human-transported materials
Cracks: 1 to 3 cm wide when dry; many cracks are filled with granular material at the surface

A horizon:
Dry color—10YR 2/2, 3/1, 3/2, 3/3, 4/2, or 5/2
Moist color—10YR 2/1, 2/2, 3/1, or 3/2
Texture—clay or clay loam
Clay content—35 to 55 percent

Bss or Bkss horizon:
Dry color—10YR 2/2, 3/1, 3/2, 3/3, 4/2, 4/3, or 5/2
Moist color—10YR 2/1, 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—clay or clay loam
Clay content—35 to 55 percent

Bk or BC horizons:
Dry color—10YR 4/2, 4/3, 4/4, 5/2, 5/3, or 5/4
Moist color—10YR 3/2, 3/3, 4/2, 4/3, 4/4, or 5/3
Texture—clay or clay loam
Clay content—28 to 50 percent

Fontana Series

The Fontana series consists of moderately deep, well drained soils that formed in colluvium and residuum weathered from soft, calcareous sedimentary bedrock. These soils are on side slopes of hills. Slopes range from 15 to 60 percent. The mean annual precipitation is about 480 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls

Typical Pedon

Fontana clay loam, 30 to 50 percent slopes; San Bernardino County, California; about 1.25 miles northwest of junction of Carbon Canyon Road and entrance to Western Hills Golf Course; 33 degrees 58 minutes 47.15 seconds N. latitude and 117 degrees 45 minutes 51.06 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Yorba Linda, California. (Colors are for dry soils unless otherwise noted.)

A1—0 to 25 centimeters; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; friable, slightly hard, slightly sticky, moderately plastic; common fine, few medium, and many very fine roots; few fine tubular and common very fine interstitial pores; slightly acid, pH 6.3; clear smooth boundary.
A2—25 to 53 centimeters; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; friable,

slightly hard, slightly sticky, moderately plastic; common fine and common very fine roots; common tubular and many very fine interstitial pores; 15 percent pressure faces; finely disseminated carbonate; 10 percent flat subangular weakly cemented 2- to 12-millimeter calcareous shale fragments; slightly effervescent; slightly alkaline, pH 7.6; clear wavy boundary.

Bk—53 to 71 centimeters; yellowish brown (10YR 5/4) channery clay loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; friable, slightly hard, slightly sticky, moderately plastic; few fine and common very fine roots; common fine tubular and common fine interstitial pores; finely disseminated carbonate, 10 percent fine distinct threadlike carbonate masses with clear boundaries in matrix, and 10 percent fine distinct irregular carbonate concretions around rock fragments; 25 percent flat subangular indurated 2- to 25-millimeter calcareous shale fragments; strongly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Cr—71 to 152 centimeters; sedimentary bedrock.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Depth to paralithic contact: 50 to 100 cm

Calcium carbonate: Does not occur in the surface horizon

Depth to secondary carbonates: 25 to 65 cm to carbonate masses and concretions; some pedons have secondary carbonate masses closer to the surface

Pressure faces: Small pressure faces on peds in some pedons

Organic matter content: 1 to 3 percent to a depth of 0 to 25 cm and decreasing regularly to less than approximately 1 percent within a depth of 55 cm

A horizons:

Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/2, 3/2, or 3/3
Texture—clay loam or loam
Reaction—slightly acid to slightly alkaline

Bk horizon:

Dry color—10YR 4/3, 4/4, 5/3, 5/4, 6/3, or 6/4
Moist color—10YR 3/3, 3/4, 4/3, 4/4, or 5/4
Texture—clay loam, loam, or channery texture
Rock fragments—typically 15 to 35 percent channers; horizon has less than 15 percent channers in some pedons
Reaction—slightly alkaline or moderately alkaline

Garretson Series

The Garretson series consists of very deep, well drained soils that formed in alluvium derived from material weathered from sandstone. These soils occur on on alluvial fans, on aprons, and in narrow valleys. Slopes range from 2 to 9 percent. The mean annual precipitation is about 380 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, active, nonacid, thermic Typic Xerorthents

Typical Pedon

Garretson very fine sandy loam, 2 to 9 percent slopes; San Bernardino County, California; 400 meters east of Highway 71, about 100 feet west of Pomona-Rincon Road, and about 25 meters north of the San Bernardino-Riverside County line; 33 degrees 55 minutes 30.77 seconds N. latitude and 117 degrees 39 minutes 0.10 second W. longitude, WGS 84 – U.S.G.S. Quad: Prado Dam, California. (Colors are for dry soil unless otherwise noted.)

Ap—0 to 18 centimeters; grayish brown (10YR 5/2) very fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common fine and very fine roots; many fine and very fine tubular and interstitial pores; neutral, pH 7.0; clear smooth boundary.

A—18 to 71 centimeters; grayish brown (10YR 5/2) fine sandy loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common fine and very fine roots; many very fine, fine, and medium pores; moderately alkaline, pH 8.2; gradual wavy boundary.

C—71 to 86 centimeters; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; very friable, hard, nonsticky, nonplastic; common fine and very fine roots; many very fine, fine, and medium tubular pores; slightly alkaline, pH 7.6; abrupt wavy boundary.

2C—86 to 107 centimeters; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; massive; very friable, hard, nonsticky, slightly plastic; common fine and very fine roots; many fine and very fine tubular pores; irregular carbonate masses in matrix; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

3C—107 to 152 centimeters; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; massive; friable, slightly hard, slightly sticky, slightly plastic; common fine and very fine roots; many fine and very fine tubular pores; slightly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Calcium carbonate: 0 to 5 percent below an approximate depth of 93 cm; some pedons have a few carbonate masses

Clay content: 18 to 27 percent

A horizon:

Dry color—10YR 4/3, 5/2, or 5/3
Moist color—10YR 3/2, 3/3, 4/2, or 4/3
Texture—very fine sandy loam, fine sandy loam, or loam
Reaction—neutral to moderately alkaline
Organic matter content—less than 1 percent

C horizons:

Dry color—10YR 5/3, 5/4, 6/3, or 6/4
Moist color—10YR 3/3, 3/4, 4/2, 4/3, 4/4, or 5/3
Texture—loam, fine sandy loam, or gravelly texture; some pedons have a few lenses of sandy loam or gravelly sandy loam
Reaction—slightly alkaline or moderately alkaline

Figure 41.—An area of Gaviota soil in an open space east of Pantera Drive in Diamond Bar.

Gaviota Series

The Gaviota series consists of very shallow, well drained soils that formed in material weathered from sandstone. These soils are on hillslopes and mountain slopes (fig. 41). Slopes range from 10 to 60 percent. The mean annual precipitation is about 464 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, nonacid, thermic Lithic Xerorthents

Typical Pedon (fig. 42)

Gaviota sandy loam in an area of Gaviota-Chumash-Rock outcrop complex, 20 to 55 percent slopes; Los Angeles County, California; Diamond Bar, 115 meters east and 200 meters north of intersection of Sims Plaza and Golden Nugget Avenue, on upper north-facing head slope of vacant hill; 33 degrees 59 minutes 59.00 seconds N. latitude and 117 degrees 48 minutes 5.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Yorba Linda, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 10 centimeters; dark grayish brown (10YR 4/2) sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; very friable, slightly hard, slightly sticky, nonplastic; common very fine tubular pores; moderately acid, pH 6.0; clear wavy boundary.

C—10 to 15 centimeters; light olive brown (2.5Y 5/4) sandy loam, olive brown (2.5Y 4/3) moist; massive; very friable, slightly hard, nonsticky, nonplastic; common very fine tubular pores; moderately acid, pH 6.0; abrupt wavy boundary.

R—15 to 30 centimeters; indurated sandstone.

Figure 42.—Representative profile of the Gaviota series. A lithic contact of sandstone is at a depth of 18 centimeters. Scale is in centimeters.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 15 cm some time between October and December and remains moist in some part below a depth of 15 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C
Depth to lithic contact: 15 to 50 cm to strongly cemented or indurated sandstone
Clay content: 10 to 18 percent
Sand content: More than 40 percent
Gravel content: 0 to 15 percent
Reaction: Moderately acid or slightly acid

A horizon:
Dry color—2.5Y or 10YR 4/2, 4/3, 5/2, 5/3, 5/4, 6/2, or 6/3
Moist color—2.5Y or 10YR 3/3, 3/4, 4/3, or 4/4
Texture—commonly sandy loam and less commonly loam; sand faction is 40 percent or more

C horizon (if it occurs):
Soil properties—similar to A horizon, but horizon is lighter in color and massive

Grommet Series

The Grommet series consists of well drained soils that formed in alluvium from mixed sedimentary sources. These soils are on alluvial fans and inset fans. Slopes range from 0 to 12 percent. The mean annual precipitation is about 410 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls

Typical Pedon

Grommet loam in an area of Urban land-Anthraltic Xerorthents, loamy substratum-Grommet complex, 0 to 5 percent slopes; Los Angeles County, California; Westwood Recreation Center near Ventura Avenue, in southern block of park between several anthropogenic mounds; 34 degrees 3 minutes 13 seconds N. latitude and 118 degrees 26 minutes 41 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Beverly Hills, California. When described, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

^A1—0 to 15 centimeters; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; friable, slightly hard, moderately sticky, slightly plastic; common fine and very fine roots; common fine interstitial pores; 2 percent gravel; neutral, pH 7.3; clear wavy boundary.

A2—15 to 45 centimeters; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; massive; friable, moderately sticky, slightly plastic; common very fine roots; few fine and common very fine tubular pores; 2 percent gravel; moderately compacted; neutral, pH 7.3; clear wavy boundary.

C1—45 to 95 centimeters; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; massive; friable, moderately sticky, slightly plastic; few very fine roots; common fine tubular and many very fine interstitial pores; 2 percent slate gravel; neutral, pH 7.3; gradual wavy boundary.

C2—95 to 190 centimeters; brown (10YR 5/3) loam, dark yellowish brown (10YR 3/4) moist; massive; friable, moderately sticky, slightly plastic; 2 percent slate gravel; neutral, pH 7.3.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 to 90 cm until April or May

Mean annual soil temperature: 18 to 20 degrees C

Thickness of human-transported materials: Variable surface thickness; less than 50 cm (20 inches)

Rock fragment content: 0 to 5 percent throughout the profile; individual horizons may have up to 15 percent fragments near canyons

Clay content: 18 to 28 percent; some pedons have up to 33 percent

Reaction: Neutral or slightly alkaline

A, ^A, or ^Au horizon:

Dry color—10YR or 7.5YR 4/2, 4/3, or 5/3

Moist color—10YR 2/2, 3/2, or 3/3

Texture—typically loam, fine sandy loam, or silt loam; clay loam in some pedons

Rock fragment content—0 to 5 percent

Artifacts (if they occur)—typically less than 10 percent variable construction debris

C horizons:

Dry color—10YR or 7.5YR 5/3, 5/4, 5/3, or 6/4

Moist color—10YR or 7.5YR 3/3, 3/4, 4/3, or 4/4

Texture—loam, fine sandy loam, or silt loam; clay loam in some pedons

Rock fragment content—0 to 5 percent

Haploxeralfs

Haploxeralfs consist of very deep, well drained soils that have a thin discontinuous layer of human-transported materials (HTM) overlying a thin discontinuous veneer of eolian sands, which overlies alluvium weathered from mixed sources. These soils are on nearly level terraces in the coastal plain. Slopes range from 0 to 2 percent. The mean annual precipitation is about 341 millimeters, and the mean annual temperature is about 17.8 degrees C.

Taxonomic Classification

Haploxeralfs

Typical Pedon

Haploxeralfs in an area of Urban land-Haploxeralfs complex, 0 to 2 percent slopes; Los Angeles County, California; City of Carson, 15 meters west of intersection of 225th Street and Kinard Avenue, on the north side of block wall; 33 degrees 49 minutes 19.10 seconds N. latitude and 118 degrees 16 minutes 46.50 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Torrance, California. (Colors are for dry soil unless otherwise noted.)

^Au—0 to 9 centimeters; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; common coarse and common very fine roots; many very fine interstitial pores; 2 percent 2- to 75-millimeter concrete fragments; moderately alkaline, pH 8.0; clear wavy boundary.

^Cu—9 to 48 centimeters; very pale brown (10YR 10/3) and brown (10YR 5/3) loam and clay loam, yellowish brown (10YR 5/4), brown (10YR 4/3), and dark grayish brown (10YR 4/2) moist; massive and moderate medium subangular blocky structure; common very fine and medium roots; common very fine interstitial pores; 10 percent clay films on all faces of peds; 5 percent medium distinct irregular strong brown (7.5YR 5/6) iron-manganese masses with sharp boundaries in matrix, from perched irrigation water; 2 percent angular indurated 2- to 75-millimeter mixed fragments; 2 percent plastic and 5 percent concrete 2- to 75-millimeter fragments; fragments are abraded gravel from local construction sites; soil structure and clay films are remnants of the source material and were formed prior to transport; moderately alkaline, pH 8.0; abrupt smooth boundary.

2E—48 to 68 centimeters; light brown (7.5YR 6/4) fine sand, brown (7.5YR 4/4) moist; single grain; loose, loose, nonsticky, nonplastic; slightly alkaline, pH 7.6; abrupt wavy boundary.

3Ab—68 to 105 centimeters; brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; friable, slightly hard, slightly sticky, nonplastic; common fine tubular and many very fine irregular pores; 3 percent relict fine prominent irregular yellowish brown (10YR 5/6) iron-manganese masses in matrix; moderately alkaline, pH 8.0; gradual wavy boundary.

3Bt1—105 to 135 centimeters; brown (10YR 5/3) clay, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; firm, extremely hard, very sticky, very plastic; 60 percent clay films on all faces of peds; 2 percent relict fine distinct spherical black (N 2/) manganese masses in matrix; moderately alkaline, pH 8.0; gradual wavy boundary.

3Bt2—135 to 160 centimeters; brown (10YR 5/4) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; firm, very hard, very sticky, very plastic; 60 percent clay films on all faces of peds; 1 percent relict fine faint irregular yellowish brown (10YR 5/6) iron-manganese masses in matrix and 1 percent relict fine faint irregular pale brown (10YR 6/3) iron depletions in matrix; moderately alkaline, pH 8.0; gradual wavy boundary.

3Btk—160 to 180 centimeters; pale brown (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; 10 percent clay films on all faces of peds; slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Note: Because of the spatial variability and thickness of the HTM, as well as the discontinuous occurrence of eolian sands, this taxonomic unit is restricted to the great group level. These soils do not qualify for the Palexeralfs great group because the HTM are not included in taxonomic depth criteria that represent natural subsoil properties.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Redoximorphic features: Few or common relict masses of manganese in the upper Bt horizon and few relict iron-manganese masses and iron depletions below a depth of 125 cm; relict redoximorphic features are inconsistently identified and do not represent current soil hydrology
Mean annual soil temperature: 18 to 20 degrees C
Thickness of human-transported materials: 0 to 60 cm
Thickness of eolian sands: 15 to 75 cm
Calcium carbonate: Some pedons have few or common masses of calcium carbonate below a depth of 150 cm

Human-transported materials (^A, ^Au, ^C, or ^Cu horizons), if they occur:
Texture—loam or sandy loam, commonly with mixed pockets of finer textured soil
Clay content—typically 9 to 15 percent at the surface with finer HTM below a thin topsoil layer
Rock fragments—0 to 5 percent mixed aggregate gravel
Artifacts—0 to 10 percent construction debris

E horizon (if it occurs):
Dry color—7.5YR or 10YR 5/3, 6/3, or 6/4
Moist color—7.5YR or 10YR 3/2, 3/3, 3/4, 4/3, 4/4, or 5/4
Texture—dominantly fine sand or sand; less commonly loamy sand or loamy fine sand

Ab horizon (if it occurs):
Dry color—2.5Y or 10YR 5/3, 5/4, 6/2, or 6/3
Moist color—2.5Y or 10YR 4/2 or 4/3
Texture—clay, fine sandy loam, or loam
Redoximorphic features—few or common relict iron-manganese masses

Bt or Btk horizons:
Dry color—2.5Y or 10YR 5/3, 6/2, 6/3, or 6/4
Moist color—2.5Y or 10YR 4/2, 4/3, 4/4, 4/6, or 5/4
Texture—clay, clay loam, sandy clay loam, or loam
Redoximorphic features—few or common relict iron-manganese masses

Haploxerepts

Haploxerepts are colluvial soils that formed in landslide deposits in hills (fig. 43). Slopes range from 10 to 75 percent. The mean annual precipitation is about 377 millimeters, and the mean annual temperature is about 17.2 degrees C.

Figure 43.—An area of Haploxerepts. A large slump block is visible on the slopes in the background, along with large free faces at the point of detachment.

Taxonomic Classification

Haploxerepts

Typical Pedon (fig. 44)

Haploxerepts, 10 to 35 percent slopes; Los Angeles County, California; Palos Verdes Nature Preserve, in an eroded landslide area at Portuguese Bend Reserve; 33 degrees 44 minutes 35.40 seconds N. latitude and 118 degrees 21 minutes 34.55 seconds W. longitude, WGS 84 – U.S.G.S. Quad: San Pedro, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 17 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; friable, slightly hard, moderately sticky, moderately plastic; finely disseminated carbonate; 3 percent flat angular 2- to 5-millimeter and 7 percent flat angular 6- to 150-millimeter calcareous shale fragments; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Bw1—17 to 50 centimeters; very pale brown (10YR 7/3) loam, light yellowish brown (10YR 6/4) moist; 24 percent clay; weak medium subangular blocky structure; friable, soft, moderately sticky, moderately plastic; finely disseminated carbonate; 3 percent flat angular 2- to 5-millimeter and 7 percent flat angular 6- to 150-millimeter calcareous shale fragments; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Bw2—50 to 95 centimeters; very pale brown (10YR 7/4) gravelly loam, light yellowish brown (10YR 6/4) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; finely disseminated carbonate; 8 percent flat angular 2- to 5-millimeter and 12 percent flat angular 6- to 150-millimeter

Figure 44.—Representative profile of Haploxerepts, at the Portuguese Bend landslide of the Palos Verdes Peninsula. Scale is in centimeters.

calcareous shale fragments; slightly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Bw3—95 to 200 centimeters; very pale brown (10YR 7/4) channery loam, brownish yellow (10YR 6/6) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; finely disseminated carbonate; 10 percent flat angular 2- to 5-millimeter and 20 percent flat angular 6- to 150-millimeter calcareous shale fragments; slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Note: This soil is classified at the great group level due to the variability of soil properties in landslide deposits. There is no consistency in rock fragment content, soil texture, and depth to bedrock.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Rock fragment content: 0 to 45 percent or more
Depth to fractured bedrock: Some pedons have a fractured lithic contact below a depth of 100 cm
Calcium carbonate equivalency: 0 to 15 percent

A horizon:
Dry color—10YR 5/2, 5/3, 6/2, 6/3, or 7/3
Moist color—10YR 4/3 or 4/4
Texture—loam or silt loam; channery or very channery

Bw horizons:
Dry color—10YR 6/3, 7/3, 7/4, 7/6, or 8/4
Moist color—10YR 5/4, 5/6, 6/4, or 6/6
Texture—loam, silt loam, or clay loam; channery or very channery
Structure—weak or medium subangular blocky

Hilmar Series

The Hilmar series consists of somewhat poorly drained soils that formed in alluvium derived from granite. These soils are on alluvial fans and valley floors. Slopes range from 0 to 2 percent. The mean annual precipitation is about 320 millimeters, and the mean annual temperature is about 17.9 degrees C.

Taxonomic Classification

Sandy over loamy, mixed, active, calcareous, thermic Aeric Halaquepts

Typical Pedon

Hilmar loamy fine sand; San Bernardino County, California; 100 feet south of Edison Road and about 200 feet west of Cucamonga Creek; 33 degrees 58 minutes 52.96 seconds N. latitude and 117 degrees 36 minutes 10.63 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Corona North, California. (Colors are for dry soil unless otherwise noted.)

Ap—0 to 33 centimeters; grayish brown (2.5Y 5/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) moist; single grain; loose, loose, nonsticky, nonplastic; many fine and many very fine roots; slightly effervescent; moderately alkaline, pH 8.2; gradual smooth boundary.
C1—33 to 41 centimeters; light yellowish brown (2.5Y 6/4) loamy sand, light olive brown (2.5Y 5/4) moist; single grain; loose, loose, nonsticky, nonplastic; common fine and common very fine roots; 1 percent fine distinct brownish yellow (10YR 6/6), dry, and yellowish brown (10YR 5/6), moist, iron-manganese concentrations; slightly effervescent; moderately alkaline, pH 8.2; gradual smooth boundary.
C2—41 to 58 centimeters; light brownish gray (2.5Y 6/2) loamy sand, grayish brown (2.5Y 5/2) moist; single grain; loose, loose, nonsticky, nonplastic; common fine and common very fine roots; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

2C—58 to 152 centimeters; light brownish gray (2.5Y 6/2) stratified loam to sandy loam to loamy sand, grayish brown (2.5Y 5/2) moist; massive; firm, hard, slightly sticky, slightly plastic; few fine and few very fine roots; 10 percent medium distinct brownish yellow (10YR 6/6), dry, and yellowish brown (10YR 5/6), moist, iron-manganese concentrations; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May; unless drained, soil is saturated at some depth between 25 to 100 cm from February until April or May
Mean annual soil temperature: 18 to 21 degrees C
Depth to loamy subsoil: 40 to 75 cm
Depth to redoximorphic features: 25 to 50 cm to iron-manganese masses
Soil salinity: Electical conductivity of 4 or more at a depth of 50 to 100 cm
Calcium carbonate: 0 to 5 percent disseminated carbonate throughout the profile; typically absent in the upper 25 cm
Rock fragment content: 0 to 5 percent
Organic matter content: Decreasing irregularly with depth

A horizon:
Dry color—2.5Y 5/2 or 5/3
Moist color—2.5Y 3/1 or 3/2
Texture—loamy fine sand, loamy sand, or fine sand

C horizons:
Dry color—2.5Y 5/2, 5/3, 5/4, 6/2, 6/3, 6/3, or 6/4
Moist color—2.5Y 5/2, 5/3, or 5/4
Texture—loamy sand, loamy fine sand, or fine sand

2C horizon:
Dry color—2.5Y 5/2, 5/3, 6/2, or 7/2
Moist color—2.5Y 5/2 or 6/2
Texture—loam or silt loam that has stratified lenses of sandy loam, loamy sand, or sand

Hueneme Series

The Hueneme series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from material weathered from mixed rock sources. Slopes are 0 to 2 percent. The mean annual precipitation is about 352 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, calcareous, thermic Oxyaquic Xerofluvents

Typical Pedon

Hueneme sandy loam in an area of Urban land-Hueneme, drained-San Emigdio complex, 0 to 2 percent slopes; Los Angeles County, California; City of Norwalk, at Hermosillo Park in the northeast corner of the soccer field; 33 degrees 53 minutes 9.00 seconds N. latitude and 118 degrees 4 minutes 35.00 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Whittier, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 12 centimeters; gray (2.5Y 5/1) sandy loam, black (2.5Y 2.5/1) moist; weak medium granular structure; friable, soft, nonsticky, nonplastic; neutral, pH 7.2; clear wavy boundary.

C1—12 to 40 centimeters; light brownish gray (2.5Y 6/2) sandy loam, very dark grayish brown (2.5Y 3/2) moist; massive; very friable, soft, nonsticky, nonplastic; slightly alkaline, pH 7.8; clear wavy boundary.

C2—40 to 55 centimeters; light yellowish brown (2.5Y 6/3) loamy sand, olive brown (2.5Y 4/3) moist; massive; very friable, soft, nonsticky, nonplastic; very slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C3—55 to 80 centimeters; light brownish gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; very friable, soft, nonsticky, nonplastic; strongly effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C4—80 to 135 centimeters; light yellowish brown (2.5Y 6/3) fine sandy loam, olive brown (2.5Y 4/3) moist; massive; very friable, soft, nonsticky, nonplastic; 5 percent fine faint irregular weakly cemented light yellowish brown (2.5Y 6/4) and olive brown (2.5Y 4/4), moist, masses of oxidized iron with diffuse boundaries in matrix; strongly effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C5—135 to 195 centimeters; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; very friable, soft, nonsticky, nonplastic; 20 percent medium distinct irregular weakly cemented masses of oxidized iron with diffuse boundaries in matrix; strongly effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

C6—195 to 200 centimeters; light gray (2.5Y 7/2) loamy sand, dark grayish brown (2.5Y 4/2) moist; massive; very friable, loose, nonsticky, nonplastic; slightly alkaline, pH 7.8.

Range in Characteristics

Soil moisture: Soil is saturated, unless drained, within a depth of 50 to 100 cm during part of the winter and spring; soil is usually moist at a depth of 20 and 60 cm from early December until about April or May; the same section is dry the rest of the year, unless the soil is irrigated

Mean annual soil temperature: 18 to 20 degrees C

Organic matter content: Decreasing irregularly with depth

Rock fragments: None or few; typically less than 2 percent gravel

Redoximorphic features: Few or common within a depth of 100 cm

Calcium carbonate: Soil is calcareous within the upper 100 cm and to greater depths; in some pedons, the soil is calcareous throughout, including the surface horizon

Clay content: Less than 15 percent in the control section

A horizon:

Dry color—10YR or 2.5Y 4/2, 4/3, 5/1, 5/2, 5/3, 6/2, or 6/3
Moist color—10YR or 2.5Y 2.5/1, 2/2, 3/2, 3/3, 4/2, or 4/3
Texture—sandy loam or loamy sand; less commonly loam
Reaction—slightly alkaline or moderately alkaline

C horizons:

Dry color—10YR or 2.5Y 5/3, 6/2, 6/3, 7/1, 7/2, or 7/3
Moist color—10YR or 2.5Y 3/2, 3/3, 4/1, 4/2, 4/3, 5/2, or 5/3
Texture—stratified sandy loam or loamy sand; average of sandy loam; thin silty or sandy strata are common
Reaction—slightly alkaline or moderately alkaline

Kawenga Series

The Kawenga series consists of well drained soils that are deep to bedrock and that formed in residuum and colluvium derived from sandstone. These soils are on hills and mountains (fig. 45). Slopes range from 15 to 75 percent. The mean annual

Figure 45.—An area of Kawenga soil. Kawenga soils are mostly at Griffith Park on north-facing slopes with dense vegetation.

precipitation is about 468 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Pachic Argixerolls

Typical Pedon (fig. 46)

Kawenga sandy loam in an area of Osito-Kawenga association, 20 to 65 percent slopes; Los Angeles County, California; on north-facing side slope of 3rd order spur ridge at Griffith Park in Los Angeles, 275 meters east and 200 meters north of water storage tank below Vista del Valley; 34 degrees 8 minutes 20.37 seconds N. latitude and 118 degrees 17 minutes 41.12 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Burbank, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 25 centimeters; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; friable, slightly hard, slightly sticky, slightly plastic; few fine and few very fine roots; few fine tubular and many very fine interstitial pores; slightly acid, pH 6.3; clear wavy boundary.

A2—25 to 50 centimeters; brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 3/3) moist; weak medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; few fine and few very fine roots; few fine and medium tubular and common very fine interstitial pores; slightly acid, pH 6.3 (pH indicator solutions); clear wavy boundary.

Bt1—50 to 105 centimeters; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; friable, hard, moderately

Figure 46.—Representative profile of the Kawenga series. The thick, dark surface horizon overlies a weathered argillic horizon. Scale is in centimeters.

sticky, slightly plastic; common fine interstitial and few fine irregular pores; 5 percent distinct clay films on all faces of peds; slightly acid, pH 6.5; gradual wavy boundary.

Bt2—105 to 148 centimeters; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; 15 percent distinct clay films on all faces of peds; slightly acid, pH 6.5; clear wavy boundary.

Cr—148 to 173 centimeters; moderately cemented sandstone.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C
Thickness of mollic epipedon: 50 to 75 cm
Depth to argillic horizon: 30 to 75 cm
Depth to paralithic contact: 100 to 175 cm
Organic matter content: 1 to 4 percent in the A horizon
Reaction: Moderately acid to neutral

A horizons:
Dry color—10YR or 7.5YR 5/2, 5/3, 4/3, or 4/2
Moist color—10YR or 7.5YR 3/2 or 3/3
Texture—loam or sandy loam; less commonly gravelly textures
Clay percentage—10 to 18 percent
Rock fragments—0 to 5 percent; some pedons have up to 25 percent gravel

Bt horizons:
Dry color—10YR or 7.5YR 4/3, 5/2, 5/3, 5/4, 6/3, or 6/4
Moist color—10YR or 7.5YR 3/3, 3/4, 4/2, 4/3, 4/4, or 4/6
Texture—loam, clay loam, or gravelly texture
Clay content—18 to 35 percent
Rock fragments—0 to 5 percent; some pedons have up to 30 percent gravel

BC horizons (if they occur):
Dry color—10YR or 7.5YR 7.5 5/2, 5/3, 5/4, 6/3, or 6/4
Moist color—10YR or 7.5YR 3/2, 3/3, 4/2, 4/3, 4/4, or 6/4
Texture—loam, clay loam, or gravelly texture
Clay content—18 to 35 percent
Rock fragments—0 to 5 percent; some pedons have up to 30 percent gravel

Kilburn Family

The Kilburn family consists of deep and moderately deep, well drained soils that formed in colluvium from metamorphic and granitic rocks. These soils are on colluvial slopes. Elevation ranges from 352 to 1,870 meters. Slopes range from 50 to 80 percent. Annual precipitation ranges from 560 to 980 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Loamy-skeletal, mixed, superactive, mesic Typic Haploxerolls

Typical Pedon (fig. 47)

Kilburn family very gravelly loam in an area of Olete-Kilburn-Etsel families complex, 50 to 80 percent slopes; Los Angeles County, California; road cut at a landslide, on Forest Road 2N80, 0.2 mile west of junction to Grizzle Flats; 34 degrees 15 minutes 38.66 seconds N. latitude and 118 degrees 12 minutes 22.45 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Condor Peak, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 18 centimeters; dark grayish brown (10YR 4/2) very gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; very friable, soft, nonsticky, nonplastic; common fine and common medium roots; many fine and many very fine interstitial pores; 10 percent nonflat subangular indurated 76- to 250-millimeter and 25 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; slightly acid, pH 6.2; abrupt smooth boundary.

Bw—18 to 38 centimeters; yellowish brown (10YR 5/4) extremely gravelly loam, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; friable, soft, nonsticky, nonplastic; few fine, many medium, and common coarse roots;

Figure 47.—Location of the representative profile of the Kilburn family in the Angeles National Forest.

few fine tubular and common fine and common very fine interstitial pores; 15 percent nonflat subangular indurated 75- to 250-millimeter and 45 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; slightly acid, pH 6.2; clear wavy boundary.

C—38 to 152 centimeters; pale brown (10YR 6/3) extremely gravelly coarse sandy loam, brown (10YR 4/3) moist; massive; very friable, soft, nonsticky, nonplastic; few fine, common medium, and common coarse roots; common fine interstitial pores; 20 percent nonflat subangular indurated 76- to 250-millimeter and 60 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; neutral, pH 6.8.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Soil depth: 50 to 152 centimeters

Soil temperature: 8 to 15 degrees C

Reaction: Moderately acid to neutral (pH 5.6 to 7.3)

Thickness of mollic epipedon: 25 to 40 cm

A horizon:

Dry color—10YR 5/4, 5/3, 5/2, 4/2, or 4/3

Moist color—10YR 4/3, 3/3, 3/2, or 2/2 or 7.5YR 3/2
Texture—gravelly loam, very gravelly loam, very gravelly sandy loam, or sandy loam
Rock fragment content—5 to 60 percent

B horizon:
Dry color—10YR 6/4, 6/3, 5/4, or 5/3 or 2.5Y 5/4 or 5/2
Moist color—10YR 5/4, 4/4, 4/3, or 3/3 or 7.5YR 4/2 or 3/2
Texture—gravelly sandy loam, very gravelly loam, or very cobbly loam
Rock fragment content—35 to 60 percent
Clay content—an estimated 3 to 5 percent more than that of A horizon

C horizon:
Dry color—10YR 7/3, 6/4, 6/3, 6/2, or 5/6 or 2.5Y 6/2
Moist color—10YR 5/6, 5/5, 4/4, or 4/3 or 2.5Y 4/2
Texture—cobbly sandy loam, very gravelly sandy loam, extremely gravelly sandy loam, or very cobbly loam
Rock fragment content—40 to 80 percent

Lithic Argixerolls

Lithic Argixerolls are well drained soils that are shallow to bedrock and that formed in residuum and colluvium weathered from volcanic rocks. These soils are on hills and foothills of mountains. Slopes range from 20 to 55 percent. The mean annual precipitation is about 494 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, thermic Lithic Argixerolls

Typical Pedon

Lithic Argixerolls sandy loam in an area of Lithic Haploxerolls-Lithic Argixerolls complex, 20 to 55 percent slopes; Los Angeles County, California; San Dimas Canyon at Sycamore Flats Mountain Highway, north along trail, 200 meters north and 185 meters west of the turnoff to the Los Angeles County Probation Center; 34 degrees 8 minutes 15.00 seconds N. latitude and 117 degrees 47 minutes 51.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Glendora, California. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 4 centimeters; grayish brown (10YR 5/2) slightly decomposed plant material; abrupt wavy boundary.
A—4 to 19 centimeters; grayish brown (10YR 5/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium granular structure; very friable, soft, nonsticky, nonplastic; few very fine roots; common very fine interstitial pores; moderately acid, pH 5.6; abrupt wavy boundary.
Bt1—19 to 31 centimeters; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; very friable, slightly hard, nonsticky, slightly plastic; few very fine roots; common very fine interstitial and common very fine tubular pores; 2 percent faint clay bridges between sand grains; moderately alkaline, pH 7.9; clear wavy boundary.
Bt2—31 to 45 centimeters; brown (7.5YR 5/2) sandy clay loam, very dark brown (7.5YR 2.5/2) moist; weak medium subangular blocky structure; very friable, slightly hard, slightly sticky, slightly plastic; common very fine interstitial and common very fine tubular pores; 5 percent faint clay bridges between sand grains; moderately alkaline, pH 8.2; abrupt broken boundary.
R—45 centimeters; indurated volcanic bedrock.

Range in Characteristics

Note: These soils are mapped at the subroup level due to the variability in clay content of the Bt horizon, their small extent, and soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil at a depth of 10 cm or more is moist from some time in November or December until some time in April or May and is dry the rest of the year
Mean annual soil temperature: 18 to 21 degrees C
Depth to lithic contact: 25 to 50 cm
Reaction: Moderately acid in the surface layer and moderately alkaline in the subsurface layers
Organic matter content: More than 1 percent

A horizon:
Dry color—10YR 4/2, 4/3, or 5/2
Moist color—10YR 2/2, 3/2, or 3/3
Texture—sandy loam
Clay content—5 to 12 percent
Rock fragment content—0 to 15 percent gravel

Bt horizons:
Dry color—10YR or 7.5Y 5/2 or 5/3
Moist color—10YR or 7.5YR 2.5/2, 3/2, or 3/3
Texture—sandy loam or sandy clay loam
Clay content—10 to 25 percent
Rock fragments—typically 0 to 15 percent gravel; isolated pedons on concave side slopes have up to 25 percent fragments

Lithic Haploxerolls

Lithic Haploxerolls are well drained soils that are very shallow or shallow to bedrock and that formed in residuum and colluvium weathered from volcanic rocks. These soils are on hills and foothills of mountains. Slopes range from 20 to 55 percent. The mean annual precipitation is about 494 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, thermic Lithic Haploxerolls

Typical Pedon

Lithic Haploxerolls in an area of Lithic Haploxerolls-Lithic Argixerolls complex, 20 to 55 percent slopes; Los Angeles County, California; San Dimas Canyon at Sycamore Flats Mountain Highway, north along trail, at 160 meters north from the turnoff to the Los Angeles County Probation Center; 34 degrees 8 minutes 14.00 seconds N. latitude and 117 degrees 47 minutes 43.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Glendora, California. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 centimeters; very dark grayish brown (10YR 3/2) slightly decomposed plant material.
A—3 to 25 centimeters; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure parting to strong fine subangular blocky; very friable, slightly hard, slightly sticky, slightly plastic; common very fine roots throughout; common very fine interstitial pores; 3

percent faint clay films on all faces of peds; 4 percent angular 2- to 75-millimeter fragments; neutral, pH 7.2; abrupt wavy boundary.
R—25 to 50 centimeters; indurated volcanic bedrock.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to variability in clay content, their small extent, and soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil at a depth of 10 cm or more is moist from some time in November or December until some time in April or May and is dry the rest of the year
Mean annual soil temperature: 18 to 21 degrees C
Depth to lithic contact: 15 to 50 cm
Rock fragment content: 0 to 15 percent
Reaction: Slightly acid or neutral

A horizon:
Dry color—10YR 4/2, 4/3, or 5/4
Moist color—10YR 2/2, 3/2, 3/3, 3/4, 4/2, or 4/3
Texture—loam, sandy loam, or sandy clay loam
Clay content—10 to 25 percent

Lodo Family

The Lodo family consists of very shallow or shallow, well drained to somewhat excessively drained soils that formed in material weathered from metamorphic, granitoid, or sedimentary rocks. These soils are on mountainsides, ridges, and basins. Elevation ranges from 1,130 to 1,525 meters. Slopes range from 30 to 70 percent. Annual precipitation ranges from 305 to 406 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Loamy, mixed, thermic Lithic Haploxerolls

Typical Pedon (fig. 48)

Lodo family gravelly loam in an area of Lodo-Modesto families complex, 30 to 70 percent slopes; Los Angeles County, California; 500 feet northwest of the intersection of Forest Roads 5N24 and 6N18; 34 degrees 30 minutes 10.43 seconds N. latitude and 118 degrees 28 minutes 56.35 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Green Valley, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 18 centimeters; brown (10YR 5/3) gravelly loam, dark brown (7.5YR 3/2) moist; strong fine granular and strong medium granular structure; friable, soft, slightly sticky, nonplastic; many very fine roots; many very fine tubular and many very fine interstitial pores; 20 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; neutral, pH 7.0; clear wavy boundary.
A2—18 to 43 centimeters; brown (10YR 5/3) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine granular and weak medium granular structure; friable, soft, slightly sticky, nonplastic; few very fine roots; many very fine tubular and many very fine interstitial pores; 20 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; neutral, pH 7.0; abrupt irregular boundary.
R—43 to 68 centimeters; indurated metamorphic bedrock.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested

Figure 48.—Location of representative profile of the Lodo family in the Angeles National Forest.

named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Depth to lithic contact: 6 to 20 inches
Mean annual soil temperature: 15 to 22 degrees C at lithic contact

A horizons:
Dry color—10YR 5/4, 5/3, 5/2 4/3, 4/2; 7.5YR 5/4, 4/4, or 4/2; 2.5Y 5/2; or 5Y 5/3
Moist color—10YR 3/3, 3/2, or 2/2; 7.5YR 3/2; or 2/5Y 3/2
Texture—loam, sandy loam, gravelly loam, gravelly sandy loam, or silt loam
Rock fragment content—0 to 30 percent
Reaction—slightly acid to mildly alkaline (pH 6.1 to 7.8)
Note—horizon rests directly on hard bedrock

Longshore Series

The Longshore series consists of very deep, well drained soils that weathered from fine grained sandstone. These soils are on side slopes and uplands of the coastal plain (fig. 49). Slopes range from 0 to 60 percent. The mean annual precipitation is about 400 millimeters, and the mean annual air temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Typic Argixerolls

Typical Pedon (fig. 50)

Longshore sandy loam in an area of Longshore-Pachic Haploxerolls complex, 20 to 55 percent slopes; Los Angeles County, California; Culver City, on a steep side slope at the Baldwin Hills Scenic Overlook; 34 degrees 1 minute 9 seconds N. latitude and 118 degrees 22 minutes 59 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Beverly Hills, California. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 centimeters; slightly decomposed plant material; abrupt wavy boundary.

A1—3 to 20 centimeters; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; moderate medium granular and moderate medium subangular blocky structure; very friable, slightly hard, nonsticky, nonplastic; many very fine roots; common fine and very fine irregular pores; 2 percent gravel; moderately acid, pH 6.0; clear wavy boundary.

A2—20 to 40 centimeters; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; friable, moderately hard, slightly sticky, nonplastic; common very fine roots; common fine and very fine irregular pores; 2 percent gravel; slightly acid, pH 6.2; clear wavy boundary.

Bt1—40 to 56 centimeters; brown (10YR 5/3) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; firm, hard, moderately sticky, very plastic; common very fine roots; common fine tubular pores; many distinct clay films on faces of peds and clay bridges between sand gains; 4 percent gravel; slightly acid, pH 6.5; clear wavy boundary.

Bt2—56 to 90 centimeters; brown (10YR 5/3) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; firm, hard,

Figure 49.—An area of Longshore soil on convex side slopes in the Baldwin Hills. Photo taken at Culver City Park, looking northeast to the Baldwin Hills Scenic Overlook.

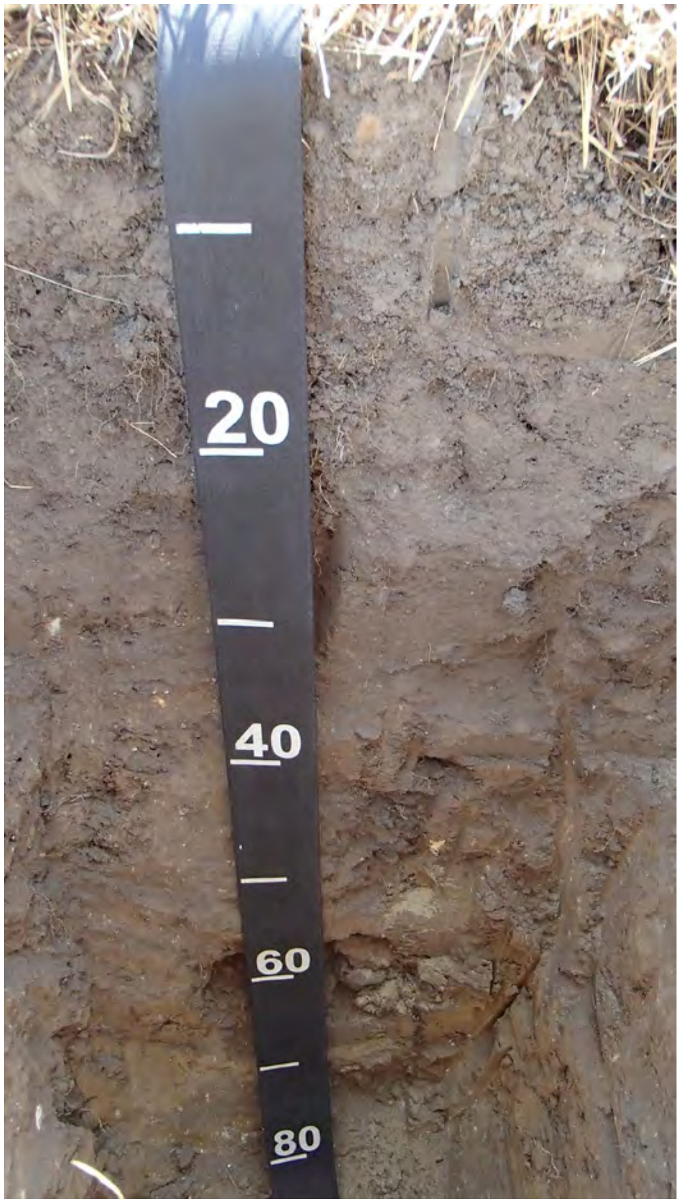


Figure 50.—Representative profile of the Longshore series, at the Baldwin Hills Scenic Overlook. The dark surface horizon extends to a weathered argillic horizon. Scale is in centimeters.

moderately sticky, moderately plastic; common very fine roots; common fine and few medium tubular pores; common distinct clay films on faces of peds and many clay bridges between sand grains; 4 percent gravel; neutral, pH 6.6; gradual wavy boundary.

Bt3—90 to 100 centimeters; brown (10YR 5/3) sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; friable, moderately hard, moderately sticky, slightly plastic; common clay bridging between sand grains; 12 percent gravel; neutral, pH 6.6; abrupt smooth boundary.

C1—100 to 120 centimeters; olive (5Y 5/3) fine sand, olive gray (5Y 4/2) moist; single grain; loose, nonsticky, nonplastic; neutral, pH 6.6; abrupt smooth boundary.

C2—120 to 170 centimeters; pale olive (5Y 6/3) fine sand, olive gray (5Y 4/2) moist; single grain; loose, nonsticky, nonplastic; neutral, pH 6.8.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of 30 cm some time between October and December and remains moist in some part between depths of 30 to 90 cm until April or May; it is dry the rest of the year
Mean annual soil temperature: 18 to 20 degrees C
Organic matter content: 2 to 4 percent from the surface to a depth of 25 to 50 cm and less than 1 percent in the subsoil
Clay content: 18 to 27 percent in the particle-size control section
Reaction: Slightly acid to slightly alkaline
Note: Some pedons do not have sandy textures below the argillic horizon

A horizons:
Dry color—10YR 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR 2/2, 3/2, or 3/3
Texture—sandy loam, fine sandy loam, or loam
Rock fragment content—0 to 10 percent

Bt horizons:
Dry color—10YR 5/3, 5/4, 5/6, 6/3, or 6/4
Moist color—10YR 3/2, 3/3, 3/4, 4/3, 4/4, 5/4, or 6/4
Texture—loam, sandy clay loam, sandy loam, or fine sandy loam
Rock fragment content—0 to 15 percent

C horizons:
Dry color—2.5Y or 5Y 5/3, 5/4, 6/3, or 6/4
Moist color—2.5Y or 5Y 4/2, 4/3, 4/4, 5/4, or 6/4
Texture—sand, fine sand, or loamy sand
Rock fragment content—0 to 15 percent

Lunada Series

The Lunada series consists of deep, well drained soils that formed in colluvium weathered from calcareous shale. These soils are on steep side slopes and canyon slopes of hills and mountains. Slopes range from 10 to 75 percent. The mean annual precipitation is about 380 millimeters, and the mean annual air temperature is about 17.2 degrees C.

Taxonomic Classification

Loamy-skeletal, mixed, superactive, thermic Typic Calcixerepts

Typical Pedon

Lunada loam in an area of Lunada-Zaca complex, 30 to 75 percent slopes; Los Angeles County, California; on a south-facing canyon side slope in stand of thick sagebrush, east of Hesse Gap in Rolling Hills; 33 degrees 45 minutes 56 seconds N. latitude and 118 degrees 20 minutes 22 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Torrance, California. When described, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 centimeters; dark gray (10YR 4/1) slightly decomposed plant material; slightly acid, pH 6.5; abrupt smooth boundary.
A—3 to 7 centimeters; light olive brown (2.5Y 5/3) loam, very dark grayish brown (2.5Y 3/2) moist; weak medium granular structure; very friable, slightly hard, moderately

sticky, moderately plastic; few fine roots; common very fine tubular pores; finely disseminated calcium carbonate; 5 percent channers; slightly effervescent; slightly acid, pH 6.5; clear wavy boundary.

Bk1—7 to 44 centimeters; light olive brown (2.5Y 5/3) very channery loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; friable, slightly hard, moderately sticky, moderately plastic; few fine and common medium roots; few fine tubular pores; few faint clay bridges between sand grains; finely disseminated calcium carbonate and common fine irregular white (10YR 8/1) calcium carbonate masses; 45 percent channers; slightly effervescent; neutral, pH 7.2; clear wavy boundary.

Bk2—44 to 67 centimeters; light yellowish brown (2.5Y 6/4) very channery loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; few fine roots; few fine irregular pores; finely disseminated calcium carbonate, common fine irregular white (10YR 8/1) calcium carbonate masses, and common medium spherical weakly cemented white (10YR 8/1) calcium carbonate concretions; 55 percent channers; strongly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Bk3—67 to 83 centimeters; pale brown (2.5Y 7/4) very channery loam, light yellowish brown (2.5Y 6/4) moist; massive; friable, moderately sticky, slightly plastic; few very fine roots; finely disseminated calcium carbonate and many medium irregular white (10YR 8/1) calcium carbonate masses; 40 percent channers and 10 percent flagstones; violently effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Bk4—83 to 120 centimeters; pale brown (2.5Y 7/3) extremely channery loam, light yellowish brown (2.5Y 6/3) moist; massive; friable, moderately sticky, slightly plastic; finely disseminated calcium carbonate and common medium irregular white (10YR 8/1) calcium carbonate masses; 75 percent channers; violently effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

R—120 centimeters; indurated shale.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 17 to 20 degrees C

Depth to lithic bedrock: 100 to 150 cm

Calcium carbonate equivalency: Greater than 15 percent within 100 cm of the mineral surface

Calcium carbonate: Disseminated carbonate occurs throughout the profile; carbonate masses begin directly below the A horizon, typically within 40 cm of the surface

Organic matter content: 1 to 3 percent in the upper 20 cm and less than 1 percent in the subsoil

Rock fragments: 35 to 75 percent channers and 0 to 20 percent flagstones

Clay content: 18 to 27 percent

A horizon:

Dry color—10YR 5/2, 5/3, or 6/3
Moist color—10YR 2/2, 3/1, 3/2, 3/3, or 4/2
Texture—loam, sandy loam, or silt loam
Rock fragment content—0 to 15 percent

Bk horizons:

Dry color—10YR 5/2, 5/3, 6/3, 6/4, 7/3, or 7/4
Moist color—10YR 4/2, 4/3, 4/4, 5/4, 6/3, or 6/4
Texture—loam, sandy loam, or silt loam

Rock fragments—25 to 75 percent; individual horizons can have 0 to 25 percent; typically channers and flagstones or cobbles and less commonly gravel

Marina Series

The Marina series consists of very deep, well drained soils that weathered from eolian deposits. These soils are on stabilized dunes. Slopes range from 0 to 30 percent. The mean annual precipitation is about 344 millimeters, and the mean annual temperature is about 17.2 degrees C.

Taxonomic Classification

Mixed, thermic Lamellic Xeropsamments

Typical Pedon

Marina sandy loam in an area of Urban land-Abaft-Marina complex, 0 to 15 percent slopes; Los Angeles County, California; Westchester neighborhood in Los Angeles, 107 meters west of the intersection of Villanova Street and 88th Place; 33 degrees 57 minutes 27.32 seconds N. latitude and 118 degrees 25 minutes 15.13 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Venice, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 12 centimeters; brown (7.5YR 5/2) sandy loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; very friable, soft, nonsticky, nonplastic; common very fine roots; slightly alkaline, pH 7.8; abrupt wavy boundary.

^Cu—12 to 28 centimeters; light brown (7.5YR 6/3) sand, brown (7.5YR 4/2) moist; single grain; very friable, nonsticky, nonplastic; common very fine roots; 1 percent angular indurated 2- to 5-millimeter mixed rock fragments; 1 percent 2- to 75-millimeter concrete and 2 percent 2- to 75-millimeter bitumen (asphalt) fragments; slightly alkaline, pH 7.4; abrupt wavy boundary.

E and Bt1—28 to 130 centimeters; brown (7.5YR 5/4) sand and loamy sand, brown (7.5YR 4/4) and dark brown (7.5YR 3/4) moist; single grain and massive; loose, nonsticky, nonplastic; clay bridges between sand grains; 10 to 25 percent, by volume, lamellae; clay bridging exists in lamellae only; slightly alkaline, pH 7.4; gradual wavy boundary.

E and Bt2—130 to 200 centimeters; reddish yellow (7.5YR 6/6) and light brown (7.5YR 6/4) sand and fine sandy loam, brown (7.5YR 4/4) and strong brown (7.5YR 4/6) moist; single grain and massive; loose, nonsticky, nonplastic; clay bridges between sand grains of lamellae; 20 to 30 percent, by volume, lamellae; slightly alkaline, pH 7.4.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 20 degrees C

Human-transported materials: Surface amendments 0 to 50 cm thick

Lamellae: Many noncemented alternating bands of lamellae and sands; lamellae become thicker with depth and have a nominal clay increase, typically less than 1 or 2 percent absolute

^A or ^Au horizon:

Dry color—7.5YR 5/3, 5/4, 6/3, or 6/4

Moist color—7.5YR 3/2, 3/3, 4/2, or 4/3

Texture—fine sand, sand, loamy sand, or loamy fine sand or finer textures; surface amendments are common in ornamental vegetation and turf

^C or ^Cu horizons:
Dry color—7.5YR 6/3, 6/4, 7/3, or 7/4
Moist color—7.5YR 3/4, 4/2, 4/3, 4/4, or 5/4
Texture—variable

(2)E and Bt horizons:
Dry color—7.5YR 6/3, 6/4, 6/6, 7/4, or 7/6
Moist color—7.5YR 3/4, 4/4, 4/6, or 5/4
Texture—sand, fine sand, loamy sand, or loamy fine sand
Clay bridges—occur only in lamellae
Lamellae—10 to 30 percent, by volume; thickness increases with depth

Metz Series

The Metz series consists of very deep, somewhat excessively drained soils that formed in alluvium derived from mixed sources. These soils are on flood plains and alluvial fans. Slopes are 0 to 2 percent. The mean annual precipitation is about 360 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Sandy, mixed, thermic Typic Xerofluvents

Typical Pedon

Metz loamy sand in an area of Urban land-Metz-Pico complex, 0 to 2 percent slopes; Los Angeles County, California; City of Long Beach, 50 meters south and 30 meters west of the intersection of Delta and 32nd Streets; 33 degrees 48 minutes 53.00 seconds N. latitude and 118 degrees 12 minutes 42.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Long Beach, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 8 centimeters; dark grayish brown (2.5Y 3/2) loamy sand, dark olive brown (2.5Y 2/2) moist; weak medium granular structure; very friable, loose, nonsticky, nonplastic; slightly alkaline, pH 7.6; clear wavy boundary.
C1—8 to 45 centimeters; light yellowish brown (2.5Y 6/3) loamy sand, dark olive brown (2.5Y 3/3) moist; massive; very friable, loose, nonsticky, nonplastic; slightly alkaline, pH 7.6; gradual wavy boundary.
C2—45 to 95 centimeters; light gray (2.5Y 7/1) sand, olive brown (2.5Y 4/3) moist; single grain; loose, loose, nonsticky, nonplastic; moderately alkaline, pH 8.0; gradual wavy boundary.
2C3—95 to 125 centimeters; light olive gray (5Y 6/2) stratified silt loam and fine sand, dark olive gray (5Y 3/2) moist; massive; friable, slightly sticky, slightly plastic; moderately alkaline, pH 8.0; gradual wavy boundary.
3C4—125 to 200 centimeters; light gray (5Y 7/1) sand, olive brown (2.5Y 4/3) moist; single grain; loose, nonsticky, nonplastic; moderately alkaline, pH 8.0.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 20 degrees C
Organic matter content: Irregular decrease with depth; average of less than 1 percent, except at the surface in areas with turf amendments
Reaction: Slightly alkaline or moderately alkaline
Calcium carbonate: Individual strata are noncalcareous or have disseminated calcium carbonate

Rock fragment content: 0 to 15 percent; individual strata may have up to 35 percent
Redoximorphic features: Few iron-manganese concentrations occur in some pedons, but they seem to be relict (from initial deposition) and are associated with the finer textures

A horizon:
Dry color—10YR or 2.5Y 3/2, 4/2, 4/3, 5/2, 5/3, or 6/2
Moist color—10YR or 2.5Y 2/2, 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—loamy sand, sand, or loam; silt loam in areas with surface amendments

C horizons:
Dry color—2.5Y or 5Y 5/3, 6/2, 6/3, 7/1, or 7/2
Moist color—2.5Y or 5Y 3/2, 3/3, 4/2, 4/3, or 5/2
Texture—loamy sand or sand; typically stratified with sands or thin layers of silt loam or loam

Mipolomol Series

The Mipolomol series consists of well drained soils that are very shallow or shallow to fractured bedrock and that formed in residuum and colluvium derived from bedded shale and sandstone. These soils are on hills and mountains. Slopes range from 30 to 75 percent. The mean annual precipitation is about 550 millimeters, and the mean annual air temperature is about 17.2 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, thermic, shallow Entic Haploxerolls

Typical Pedon

Mipolomol channery loam in an area of Mipolomol-Topanga association, 30 to 75 percent slopes; Ventura County, California; on side of a mountain at an elevation of 370 meters, about 1 mile north of the junction of Highways 1 and 23, about 750 feet south of the northwest corner of section 29, T. 1 S., R. 21 W.; 34 degrees 3 minutes 26 seconds N. latitude and 118 degrees 53 minutes 37 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Triunfo Pass, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 30 centimeters; brown (10YR 5/3) channery loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine and fine roots; few fine interstitial pores; 30 percent fine channers; 5 percent fine subangular soft pararock fragments; neutral, pH 6.6; abrupt wavy boundary.
Cr—30 to 55 centimeters; highly fractured bedded shale; fractures are 1 to 3 inches apart and contain about 5 to 10 percent soil with few very fine roots.

Range in Characteristics

Soil moisture: Soil is moist from mid-November or December until some time in April or May and dry the rest of the year
Mean annual soil temperature: 17 to 20 degrees C
Depth to paralithic contact: 10 to 35 cm to weakly or moderately cemented sedimentary bedrock

A horizon:
Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 3/2 or 3/3
Clay content—18 to 27 percent

Rock fragment content—15 to 35 percent
Organic matter content—2 to 4 percent

Mocho Series

The Mocho series consists of very deep, well drained soils that formed in alluvium derived mostly from sandstone and shale. These soils are on alluvial fans and the valley floor. Slopes range from 0 to 9 percent. The mean annual precipitation is about 430 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Fluventic Haploxerolls

Typical Pedon

Mocho loam in an area of Mocho-Urban land complex, 0 to 2 percent slopes; Los Angeles County, California; 22 meters south and 91 meters east of the intersection of Sherman Way and Corbin Avenue; 34 degrees 12 minutes 3.1 seconds N. latitude and 118 degrees 33 minutes 40.4 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Canoga Park, California. (Colors are for dry soil unless otherwise noted.)

Ap—0 to 10 centimeters; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; friable, hard, slightly sticky, slightly plastic; many very fine roots; few very fine and medium tubular and few very fine interstitial pores; finely disseminated carbonate; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

A—10 to 41 centimeters; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; friable, hard, slightly sticky, slightly plastic; many very fine roots; few very fine and medium tubular and few very fine interstitial pores; finely disseminated carbonate and threadlike carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk1—41 to 74 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; few very fine roots; common very fine tubular and few very fine interstitial pores; finely disseminated carbonate and threadlike carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Bk2—74 to 119 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; massive; friable, hard, slightly sticky, slightly plastic; few very fine roots; few fine and very fine tubular pores; finely disseminated carbonate and threadlike carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk3—119 to 145 centimeters; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; massive; friable, hard, slightly sticky, moderately plastic; few very fine roots; few very fine tubular pores; finely disseminated carbonate and threadlike carbonate masses in matrix; violently effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk4—145 to 193 centimeters; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; massive; friable, hard, moderately sticky, moderately plastic; few fine roots; few very fine tubular pores; finely disseminated carbonate and threadlike carbonate masses; violently effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 20 degrees C
Organic matter content: Decreasing irregularly below a depth of 40 to 50 cm; average of less than 1 percent below a depth of 40 cm
Rock fragment content: 0 to 15 percent in the upper 100 cm and up to 35 percent in the subsoil
Calcium carbonate: Soil is weakly to strongly calcareous throughout with few or common fine carbonate masses; some pedons do not have disseminated carbonate or masses

A horizons:
Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 3/2 or 3/3
Texture—loam

Bk horizons:
Dry color—10YR 6/2, 6/3, or 7/3
Moist color—10YR 4/2 or 4/3
Texture—loam, clay loam, sandy clay loam, or silty clay loam with stratified layers of coarse textures

Modesto Family

The Modesto family consists of deep and moderately deep, well drained soils that formed in material weathered from schist, gneiss, granitic rock, and partly consolidated old alluvial sediments. These soils are on mountainsides, ridges, or remnants of old alluvial fans or stream terraces. Elevation ranges from 375 to 970 meters. Slopes range from 15 to 70 percent. Annual precipitation ranges from 460 to 760 inches.

Taxonomic Classification

Fine-loamy, mixed, active, thermic Mollic Haploxeralfs

Typical Pedon (fig. 51)

Modesto family loam in an area of Lodo-Modesto families complex, 30 to 70 percent slopes; Los Angeles County, California (outside soil survey area of Los Angeles County, Southwest Part); road cut on Forest Road 6N08 at Artesian Spring Campground; 34 degrees 34 minutes 11.24 seconds N. latitude and 118 degrees 21 minutes 39.72 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Sleepy Valley, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 8 centimeters; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; friable, soft, slightly sticky, nonplastic; common medium and few very fine roots; many very fine and many fine tubular and many fine and many very fine interstitial pores; neutral, pH 7.0; clear smooth boundary.
A2—8 to 20 centimeters; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; friable, soft, slightly sticky, slightly plastic; common medium and few very fine roots; many very fine and many fine tubular pores and many fine and many very fine interstitial pores; neutral, pH 7.2; clear smooth boundary.
Bt1—20 to 56 centimeters; brown (7.5YR 5/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; friable, hard, moderately sticky, moderately plastic; common medium roots; common very fine tubular and common very fine interstitial pores; 25 percent distinct clay films on surfaces along pores; 5 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; neutral, pH 7.0; abrupt smooth boundary.

Figure 51.—Location of representative profile of the Modesto family in the Angeles National Forest.

Bt2—56 to 117 centimeters; yellowish red (5YR 4/6) clay loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; friable, hard, moderately sticky, moderately plastic; common medium roots; common very fine tubular and common very fine interstitial pores; 50 percent prominent clay films on surfaces along pores; 5 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; neutral, pH 7.0; abrupt wavy boundary.

R—117 to 142 centimeters; strongly cemented schist.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Depth to lithic or paralithic contact: 43 to 152 cm

Soil temperature: 15 to 22 degrees C at a depth of 50 cm

A horizons:

Dry color—10YR 6/4, 6/3, 5/3, 5/2, 4/3, 4/2, or 3/3 or 7.5Y 5/4 or 4/4
Moist color—10YR 3/4, 3/3, 3/2, or 2/2; 7.5Y 3/2; or 5YR 3/4
Texture—loam, gravelly loam, or sandy loam
Rock fragments—0 to 20 percent gravel
Reaction—slightly acid to mildly alkaline (pH 6.1 to 7.8)

Bt horizons:

Dry color—10YR 6/4, 5/6, 5/4, 5/3, or 4/4; 7.5YR 5/4, 6/4, 5/6, or 4/4; or 5YR 5/6, 4/6, or 4/4
Moist color—10YR 4/4 or 3/4; 7.5YR 5/4 or 4/4; or 5YR 4/4
Texture—loam, clay loam, gravelly clay loam, sandy clay loam, or silty clay loam
Rock fragments—0 to 30 percent gravel
Reaction—moderately acid to mildly alkaline (pH 5.6 to 7.8)
Note—in some pedons horizon rests directly on paralithic or lithic contact; in other pedons a C or Bt3 horizon underlies the Bt2

Modjeska Family

The Modesto family consists of deep, well drained soils that formed in material weathered from schist, gneiss, granitic rock, and partly consolidated old alluvial sediments. These soils are on mountainsides, ridges, or remnants of old alluvial fans or stream terraces. Elevation ranges from 460 to 1,525 feet. Slopes range from 15 to 70 percent. Annual precipitation ranges from 305 to 1,778 millimeters.

Taxonomic Classification

Loamy-skeletal, mixed, thermic Typic Haploxerepts

Typical Pedon (fig. 52)

Modjeska family cobbly sandy loam in an area of Trigo, granitic substratum-Modjeska families association, 5 to 60 percent slopes; Los Angeles County, California; road cut on the Upper Big Tujunga Road under construction, between Lynx Gulch and Alder Creek Roads, 300 feet east and 200 feet south of the northwest corner of section 30,

Figure 52.—Location of representative profile of the Modjeska family in the Angeles National Forest.

T. 3 N., R. 11 W.; 34 degrees 18 minutes 35.48 seconds N. latitude and 118 degrees 4 minutes 48.57 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Chilao Flat, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 8 centimeters; brown (10YR 4/3) cobbly sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine granular structure; friable, slightly hard, slightly sticky, nonplastic; common fine and common very fine roots; common fine and common very fine interstitial pores; 10 percent 2- to 76-millimeter and 15 percent 76- to 250-millimeter nonflat subangular indurated metamorphic rock fragments; moderately acid, pH 5.8; clear smooth boundary.

Bw1—8 to 51 centimeters; dark yellowish brown (10YR 4/4) very cobbly sandy loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; few fine, few medium, and few very fine roots; few fine interstitial and few fine and few medium tubular pores; 5 percent 250- to 600-millimeter, 15 percent 2- to 75-millimeter, and 20 percent 75- to 250-millimeter nonflat subangular indurated metamorphic rock fragments; neutral, pH 6.6; clear smooth boundary.

Bw2—51 to 142 centimeters; yellowish brown (10YR 5/4) very cobbly sandy clay loam, brown (10YR 4/3) moist; moderate fine and moderate medium subangular blocky structure; firm, hard, moderately sticky, slightly plastic; few fine and few medium roots; few fine interstitial and few fine tubular pores; 20 percent 2- to 76-millimeter, 20 percent 76- to 250-millimeter, and 50 percent nonflat subangular indurated 250- to 600-millimeter metamorphic rock fragments; slightly acid, pH 6.5; abrupt wavy boundary.

Cr—142 to 167 centimeters; moderately cemented igneous and metamorphic bedrock.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Depth to lithic or paralithic contact: 20 to 60 inches
Soil temperature: 15 to 22 degrees C at a depth of 50 cm

A horizon:
Dry color—10YR 6/4, 6/3, 5/3, 5/2, 4/3, 4/2, or 3/3 or 7.5Y 5/4 or 4/4
Moist color—10YR 3/4, 3/3, 3/2, or 2/2; 7.5Y 3/2; or 5YR 3/4
Texture—loam, gravelly loam, or sandy loam
Rock fragments—0 to 40 percent gravel
Reaction—slightly acid to mildly alkaline (pH 6.1 to 7.8)

Bw horizons:
Dry color—10YR 6/4, 5/6, 5/4, 5/3, or 4/4; 7.5YR 5/4, 6/4, 5/6, or 4/4; or 5YR 5/6, 4/6, or 4/4
Moist color—10YR 4/4 or 3/4; 7.5YR 5/4 or 4/4; or 5YR 4/4
Texture—loam, clay loam, gravelly clay loam, sandy clay loam, or silty clay loam
Rock fragments—0 to 50 percent gravel
Reaction—moderately acid to mildly alkaline (pH 5.6 to 7.8)
Note—in some pedons horizon rests directly on the paralithic or lithic contact; in others a C horizon underlies the Bw

Mollic Haploxeralfs

Mollic Haploxeralfs are well drained soils that formed in material weathered from schist, granitic rock, gneiss, sandstone conglomerate, and alluvium from mixed sources. These soils are on old terraces and alluvial fans and on mountainsides and ridges. Slopes range from 2 to 50 percent. Elevation ranges from 344 to 623 meters. Annual precipitation ranges from 590 to 690 millimeters.

Taxonomic Classification

Fine-loamy, mixed, thermic Mollic Haploxeralfs

Typical Pedon

Typical pedon location information is not available. The representative component profile has been determined using field notes. Horizon colors are not available.

A—0 to 20 centimeters; gravelly sandy loam; weak fine granular and weak medium subangular blocky structure; 25 percent 2- to 75-millimeter and 3 percent 75- to 250-millimeter coarse fragments; neutral, pH 7.0

Bt—20 to 89 centimeters; sandy clay loam; 10 percent 2- to 75-millimeter coarse fragments; moderate fine and moderate medium subangular blocky structure; neutral, pH 7.0.

Cr—89 to 104 centimeters; moderately cemented metamorphic bedrock.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest. The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Soil temperature: 10 to 18 degrees C at a depth of 50 cm

Depth to paralithic bedrock: 50 to 152 cm

A horizon:

Dry color—10YR 5/3, 4/3, or 4/2 or 2.5Y 5/2
Moist color—10YR 3/3 or 3/2 or 2.5Y 2/2
Texture—sandy loam, gravelly sandy loam, or gravelly loam
Rock fragment content—5 to 20 percent
Reaction—slightly acid to mildly alkaline (pH 6.1 to 7.8)

Bw horizon (if it occurs):

Dry color—10YR 5/4 or 2.5Y 6/2
Moist color—10YR 4/4 or 3/4 or 2/5Y 5/2
Texture—sandy loam, gravelly sandy loam, or gravelly clay loam
Rock fragment content—20 to 30 percent
Reaction—slightly acid to mildly alkaline (pH 6.1 to 7.8)

Bt horizon:

Dry color—5YR 5/4, 10YR 5/4 or 5/3, 2.5Y 6/2, or 5Y 5/3
Moist color—10YR 4/4, 2.5Y 5/2, or 5Y 4/2
Texture—sandy clay loam, gravelly sandy clay loam, cobbly clay loam, silty clay loam, or clay

Rock fragment content—5 to 55 percent
Reaction—moderately acid to mildly alkaline (pH 5.6 to 7.8)
Note—horizon grades into weathered rock that is difficult to dig with a spade

Mollic Haploxeralfs, Coastal

Mollic Haploxeralfs, coastal are moderately deep, well drained soils that formed in residuum weathered from volcanic bedrock. These soils are on risers of marine terraces. Slopes range from 20 to 55 percent. The mean annual precipitation is about 360 millimeters, and the mean annual temperature is about 17.2 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Mollic Haploxeralfs

Typical Pedon

Mollic Haploxeralfs, coastal in an area of Mollic Haploxeralfs, coastal-Topdeck-Urban land complex, 20 to 55 percent slopes; Los Angeles County, California; Forrestal Nature Reserve, near quarry area, above highwall on intact slope, on side of broad spur ridge near old firebreak cut; 33 degrees 44 minutes 35.01 seconds N. latitude and 118 degrees 21 minutes 1.59 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Redondo Beach, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 13 centimeters; brown (7.5YR 5/3) loam, dark brown (7.5YR 3/2) moist; moderate medium granular structure; common fine tubular pores; 5 percent angular indurated 2- to 75-millimeter basalt fragments; slightly effervescent; moderately alkaline, pH 7.8; clear wavy boundary.

Btk1—13 to 45 centimeters; brown (7.5YR 5/3) clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; common very fine irregular pores; 30 percent distinct clay films on all faces of peds; finely disseminated carbonate and 3 percent medium prominent irregular white (10YR 8/1) carbonate masses in matrix; 5 percent angular indurated 2- to 75-millimeter basalt fragments; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Btk2—45 to 98 centimeters; light brown (7.5YR 6/3) clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; common very fine irregular pores; 30 percent distinct clay films on all faces of peds; finely disseminated carbonate and 3 percent medium prominent irregular white (10YR 8/1) carbonate masses in matrix; 5 percent angular indurated 2- to 75-millimeter basalt fragments; violently effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

R—98 to 123 centimeters; strongly cemented bedrock.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 17 to 20 degrees C
Depth to lithic contact: 70 to 105 cm
Surface fragments: 5 to 10 percent angular gravel
Rock fragment content: Less than 15 percent throughout the profile
Reaction: Slightly alkaline or moderately alkaline

A horizon:
Dry color—7.5YR 4/3, 4/4, 5/3, or 6/3
Moist color—7.5R 3/2, 4/2, or 4/3

Texture—loam
Clay content—20 to 27 percent

Btk horizons:
Dry color—7.5YR 5/3, 5/4, 6/3, 6/4, or 7/4
Moist color—7.5YR 3/4, 4/4, 4/6, or 5/6
Texture—loam or clay loam
Clay content—24 to 34 percent
Calcium carbonate—few or common carbonate masses
Calcium carbonate equivalency—2 to 12 percent

Montebello Series

The Montebello series consists of very deep, well drained soils that formed in human-transported materials (HTM) on graded alluvial fans that originate from granitic sources. Slopes range from nearly level to 15 percent. The mean annual precipitation is about 445 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, spolic, mixed, superactive, nonacid, thermic Typic Xerorthents

Typical Pedon (fig. 53)

Montebello silt loam in an area of Urban land-Azuvina-Montebello complex, 0 to 5 percent slopes; Los Angeles County, California; northeast corner of Mills Park on Wheeler Road in La Verne; 34 degrees 8 minutes 5 seconds N. latitude and 117 degrees 46 minutes 30 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Glendora, California. When described, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

^A—0 to 9 centimeters; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular and moderate thin platy structure; soft, friable, slightly sticky, slightly plastic; common very fine and medium roots; common very fine and fine interstitial pores; neutral, pH 7.2; abrupt wavy boundary.

^C—9 to 87 centimeters; dark brown (7.5YR 3/3) clay loam, 85 percent dark brown (7.5YR 3/3), 10 percent strong brown (7.5YR 4/6), and 5 percent brown (10YR 5/3) moist; massive; very hard, friable, slightly sticky, slightly plastic; common very fine roots throughout; few very fine interstitial pores; slightly alkaline, pH 7.4; abrupt smooth boundary.

2Bt1—87 to 135 centimeters; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; common distinct clay films on surfaces along root channels; slightly alkaline, pH 7.8; clear wavy boundary.

2Bt2—135 to 200 centimeters; light brown (7.5YR 6/4) clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; common distinct clay films on faces of peds; slightly alkaline, pH 7.8.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between a depth of about 30 to 90 cm until April or May; soil is dry the rest of the year
Mean annual soil temperature: 18 to 21 degrees C
Thickness of human-transported materials: More than 50 cm
Reaction: Slightly acid to slightly alkaline
Effervescence: Typically noneffervescent

Figure 53.—Representative profile of the Montebello series. Human-transported materials overlie the natural subsoil (at a depth of 110 centimeters). Evidence of human-transported materials includes a thin layer of gravel, visible on the left sidewall at a depth of 70 centimeters. The natural substratum is an intact, truncated argillic horizon. Scale is in centimeters.

Clay content: 18 to 35 percent
Note: Some pedons have pulverized concrete mixed into the HTM

^A or ^Au horizon:
Dry color—10YR or 7.5YR 3/3, 4/2, 4/3, 5/2, 5/3, or 6/3
Moist color—10YR or 7.5YR 2/2, 3/1, 3/2, 3/3, 3/4, 4/2, or 4/3
Texture—loam, silt loam, sandy loam, or fine sandy loam

Rock fragment content—0 to 15 percent
Artifacts—0 to 10 percent

^C or ^Cu horizon:
Dry color—10YR or 7.5YR 3/3, 4/2, 4/3, 4/4, 5/3, 5/4, 6/2, 6/3, or 7/3
Moist color—10YR or 7.5YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 4/6, or 5/4
Texture—clay loam, loam, sandy clay loam, sandy clay, or sandy loam; in some pedons, horizon is coarser textured and has variable fragments
Rock fragment content—0 to 15 percent; up to 35 percent in some pedons
Artifacts—0 to 10 percent

2Bt horizons:
Dry color—10YR or 7.5YR 4/3, 4/4, 5/3, 5/4, 5/6, 6/3, 6/4, 6/6, 7/3, or 7/4
Moist color—10YR or 7.5YR 3/4, 4/3, 4/4, 5/4, or 5/6
Texture—clay loam, loam, sandy clay loam, or sandy loam
Rock fragment content—0 to 15 percent

Myford Series

The Myford series consists of deep, moderately well drained soils that formed in alluvium derived dominantly from sandstone. These soils are on alluvial fans and remnant terraces. The mean annual precipitation is about 350 millimeters, and the mean annual air temperature is about 17.6 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Typic Palexeralfs

Typical Pedon

Myford sandy loam, 2 to 9 percent slopes; Orange County, California; Irvine Ranch; 33 degrees 38 minutes 45.0 seconds N. latitude and 117 degrees 42 minutes 12.0 seconds W. longitude, NAD 83 – U.S.G.S. Quad: El Toro, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 2 centimeters; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak medium platy structure; friable, slightly hard, nonsticky, nonplastic; many very fine roots; many very fine tubular pores; moderately acid, pH 6.0; abrupt smooth boundary.

A2—2 to 11 centimeters; pinkish gray (7.5YR 6/2) sandy loam, brown (7.5YR 4/2) moist; weak medium platy structure; friable, hard, nonsticky, nonplastic; common very fine roots; many very fine tubular pores; moderately acid, pH 6.0; clear smooth boundary.

A3—11 to 30 centimeters; pinkish gray (7.5YR 6/2) sandy loam, brown (7.5YR 4/2) moist; slightly heavier texture in this horizon; massive; friable, hard, nonsticky, nonplastic; common very fine roots; many very fine tubular pores; moderately acid, pH 6.0; abrupt smooth boundary.

Bt1—30 to 45 centimeters; brown (7.5YR 4/2) and light gray (10YR 7/2) clay, dark brown (7.5YR 3/2) moist; strong very coarse prismatic structure; very firm, extremely hard, very sticky, very plastic; common very fine roots; common very fine tubular pores; 30 percent clay films on all faces of peds and 30 percent clay films on surfaces along pores; moderately acid, pH 6.0; horizon has a 0.5-inch-thick (1.27-cm-thick) cap; clear smooth boundary.

Bt2—45 to 70 centimeters; brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate coarse prismatic structure parting to strong coarse angular blocky; very firm, extremely hard, very sticky, very plastic; few very fine roots; common very fine tubular pores; 10 percent clay films on surfaces along pores; neutral, pH 7.0; clear smooth boundary.

Btk1—70 to 90 centimeters; yellowish brown (10YR 5/4) sandy clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate coarse angular blocky; firm, very hard, moderately sticky, moderately plastic; few very fine roots; common very fine tubular pores; 10 percent clay films on surfaces along pores; medium weakly cemented carbonate masses; violently effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Btk2—90 to 105 centimeters; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/2) moist; weak coarse prismatic structure parting to moderate coarse angular blocky; firm, very hard, slightly sticky, moderately plastic; few very fine roots; common very fine tubular pores; 30 percent clay films on all faces of peds and 30 percent clay films on surfaces along pores; threadlike carbonate masses; slightly effervescent; moderately alkaline, pH 8.0; diffuse smooth boundary.

B´t1—105 to 125 centimeters; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/2) moist; weak coarse prismatic structure parting to moderate coarse angular blocky; firm, very hard, slightly sticky, moderately plastic; few very fine roots; common very fine tubular pores; 30 percent clay films on all faces of peds and 30 percent clay films on surfaces along pores; moderately alkaline, pH 8.0; diffuse smooth boundary.

B´t2—125 to 155 centimeters; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/2) moist; weak coarse prismatic structure parting to moderate coarse angular blocky; firm, very hard, slightly sticky, moderately plastic; few very fine roots; many very fine tubular pores; 30 percent clay films on surfaces along pores and 30 percent clay films on all faces of peds; slightly acid, pH 6.5; diffuse smooth boundary.

B´t3—155 to 180 centimeters; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/2) moist; weak coarse prismatic structure parting to moderate coarse angular blocky; firm, very hard, slightly sticky, moderately plastic; many very fine tubular pores; 30 percent clay films on surfaces along pores and 30 percent clay films on all faces of peds; slightly acid, pH 6.5; clear wavy boundary.

C—180 to 200 centimeters; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; massive; friable, slightly hard, nonsticky, nonplastic; common very fine tubular pores; slightly acid, pH 6.5.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 17 to 20 degrees C

Abrupt textural change: Clay increase of 25 to 40 percent absolute at a depth of 20 to 50 cm

A horizons:

Dry color—7.5YR or 10YR 5/2, 5/3, or 6/2
Moist color—7.5YR or 10YR 3/2, 3/3, 4/2, or 4/3
Texture—sandy loam or loam
Reaction—strongly acid to slightly acid

Bt or Btk horizons:

Dry color—7.5YR or 10YR 4/2, 4/3, 5/3, 5/4, 6/3, 6/4, 6/6, or 7/4
Moist color—7.5YR or 10YR 3/2, 3/3, 4/2, 4/3, or 4/4
Texture—clay, sandy clay, or clay loam in upper part and sandy clay loam or clay loam in lower part
Reaction—moderately acid to moderately alkaline in upper part and moderately alkaline in lower part

Figure 54.—An area of Nacimiento soil. Photo taken on the rounded hills at Elyria Canyon Park in Mount Washington.

Note—few or common masses or weakly cemented concretions occur in some horizons

C horizon:

Dry color—7.5YR or 10YR 6/3, 6/4, 6/6, 7/3, or 7/4
Moist color—7.5YR or 10YR 4/3, 5/3, or 5/4
Texture—sandy loam or sandy clay loam

Nacimiento Series

The Nacimiento series consists of moderately deep, well drained soils that formed in colluvium and/or residuum weathered from calcareous sedimentary rocks. These soils are on rolling hills (fig. 54). Slopes range from 20 to 55 percent. The mean annual precipitation is about 460 millimeters, and the mean annual temperature is about 18.4 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls

Typical Pedon

Nacimiento loam in an area of Counterfeit-Nacimiento, warm-Urban land association, 20 to 55 percent slopes; Los Angeles County, California; nose of dissected slope at Elyra Canyon Park near Mt. Washington; 34 degrees 6 minutes 6.66 seconds N. latitude and 118 degrees 13 minutes 21.25 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Los Angeles, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 27 centimeters; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; strong fine granular structure; friable, moderately hard, moderately sticky, moderately plastic; common fine and very fine roots; common fine tubular and many very fine interstitial pores; 1 percent nonflat subangular strongly cemented 5- to 76-millimeter and 2 percent nonflat subangular strongly cemented 2- to 5-millimeter calcareous shale fragments; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Bk1—27 to 45 centimeters; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; friable, moderately hard, moderately sticky, moderately plastic; common very fine roots; common fine tubular and very fine interstitial pores; finely disseminated carbonate and 2 percent fine prominent white (10YR 8/1) carbonate masses throughout; 1 percent nonflat subangular strongly cemented 5- to 76-millimeter and 2 percent nonflat subangular strongly cemented 2- to 5-millimeter calcareous shale fragments; strongly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Bk2—45 to 62 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; friable, moderately hard, moderately sticky, moderately plastic; few very fine roots; common fine tubular and common very fine interstitial pores; finely disseminated carbonate and 2 percent fine prominent white (10YR 8/1), dry, carbonate masses throughout; 5 percent nonflat subangular strongly cemented 2- to 5-millimeter and 5 percent nonflat subangular strongly cemented 5- to 76-millimeter calcareous shale fragments; violently effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

Cr—62 to 87 centimeters; weakly cemented calcareous sedimentary bedrock.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Depth to paralithic bedrock: 50 to 100 cm to weakly or moderately cemented calcareous sedimentary bedrock

Pressure faces: Some pedons have pressure faces on peds and few cracks may occur during the dry season

Organic matter content: 2 to 4 percent in the upper 25 cm; decreasing regularly to less than 1 percent within a depth of 50 cm

Reaction: Moderately alkaline

Calcium carbonate: Soil is calcareous throughout

A horizon:

Dry color—10YR 4/2, 4/3, or 5/3
Moist color—10YR 2/2, 3/1, 3/2, or 3/3
Texture—loam or clay loam
Rock fragment content—0 to 15 percent

Bk horizons:

Dry color—10YR 5/3, 6/2, 6/3, 6/4, 7/3, or 7/4
Moist color—10YR 3/3, 4/2, 4/3, or 4/4
Texture—loam or clay loam
Rock fragment content—0 to 15 percent; higher percentages occur directly over the paralithic bedrock
Calcium carbonate—few to many threadlike or irregular calcium carbonate masses

Figure 55.—An area of Oceanaire soil at San Ramon Reserve on the Palos Verdes Peninsula.

Oceanaire Series

The Oceanaire series consists of deep, well drained soils that formed in material weathered from calcareous shale or limestone. These soils are on side slopes of hills and low mountains (fig. 55). Slopes range from 10 to 55 percent. The mean annual precipitation is about 370 millimeters, and the mean annual air temperature is about 17 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Calcic Haploxeralfs

Typical Pedon

Oceanaire soil in an area of Oceanaire-Filiorum complex, 10 to 35 percent slopes; Los Angeles County, California; Rancho Palos Verdes at the San Ramon Reserve of the Palos Verdes Nature Preserve, 400 meters east and 85 meters north of the intersection of Palos Verdes Drive East and Palo Verdes Drive South; 33 degrees 43 minutes 48 seconds N. latitude and 118 degrees 19 minutes 59 seconds W. longitude, WGS 84 – U.S.G.S. Quad: San Pedro, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 11 centimeters; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; strong fine granular structure; friable, slightly hard, slightly sticky, slightly plastic; common very fine roots; common fine and few coarse tubular pores; finely disseminated calcium carbonate; 1 percent shell fragments and 2 percent channers; strongly effervescent; moderately alkaline, pH 8.0; clear boundary.

Bt—11 to 28 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; friable, slightly hard, moderately sticky, slightly plastic; common very fine roots; common fine irregular pores; few clay

films on faces of peds; finely disseminated calcium carbonate; 3 percent channers; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Btk1—28 to 65 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; few medium and very fine roots; common fine tubular and common very fine irregular pores; few clay films on faces of peds; finely disseminated calcium carbonate and common medium irregular calcium carbonate masses; 3 percent channers; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Btk2—65 to 130 centimeters; light yellowish brown (10YR 7/3) loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; friable, moderately sticky, moderately plastic; few medium and very fine roots; common very fine irregular pores; common clay films on faces of peds; finely disseminated calcium carbonate and common medium irregular calcium carbonate masses; 3 percent channers; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Cr—130 to 140 centimeters; moderately cemented limestone.

R—140 to 165 centimeters; indurated limestone.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May; soil is dry the rest of the year

Mean annual soil temperature: 17 to 20 degrees C

Rock fragments: 0 to 15 percent; some pedons are channery or very channery directly above shale bedrock

Depth to argillic horizon: 10 to 65 cm

Depth to calcic horizon: 45 to 100 cm

Depth to lithic contact: 100 to 150 cm

Reaction: Slightly alkaline or moderately alkaline

A horizon:

Dry color—10YR 4/2, 5/3, or 6/3
Moist color—10YR 2/1, 2/2, 3/1, 3/2, 3/3, or 4/2
Texture—loam, fine sandy loam, or silt loam
Clay content—8 to 22 percent
Rock fragment content—0 to 5 percent

Bt horizon:

Dry color—10YR or 7.5YR 5/3, 5/4, 6/3, or 7/3
Moist color—10YR or 7.5YR 3/3, 4/3, 4/4, or 4/6
Texture—loam, fine sandy loam, or clay loam
Clay content—20 to 28 percent

Btk horizons:

Dry color—10YR or 7.5YR 6/3, 6/4, 7/3, or 7/4
Moist color—10YR or 7.5YR 4/3, 4/4, 4/6, 5/3, or 5/4
Texture—loam or clay loam
Clay content—20 to 28 percent

Olete Family

The Olete family consists of moderately deep or deep, well drained soils that formed in colluvium from gneissic or granitic rocks. These soils are on colluvial slopes. Elevation ranges from 350 to 1,865 meters. Slopes range from 50 to 80 percent. Annual precipitation ranges from 560 to 980 millimeters.

Figure 56.—Location of representative profile of the Olete family in the Angeles National Forest.

Taxonomic Classification

Loamy-skeletal, mixed, mesic Typic Haploxerepts

Typical Pedon (fig. 56)

Olete cobbly loam in an area of Olete-Kilburn-Etsel families complex, 50 to 80 percent slopes; Los Angeles County, California; road cut on Grizzly Flat Road, 0.9 mile from the junction with Forest Road 2N80 where the road makes a bend and intersects a large gully; 34 degrees 16 minutes 0.41 second N. latitude and 118 degrees 12 minutes 26.07 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Condor Peak, California. (Colors are for dry soil unless otherwise noted.)

Oe—0 to 1 centimeter; moderately decomposed plant material.

A1—1 to 9 centimeters; dark brown (10YR 3/3) cobbly loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; friable, soft, nonsticky, nonplastic; common fine, common medium, and common very fine roots; many fine and many very fine interstitial pores; 10 percent 2- to 76-millimeter and 20 percent 76- to 250-millimeter nonflat subangular indurated mixed rock fragments; slightly acid, pH 6.2; clear smooth boundary.

A2—9 to 22 centimeters; yellowish brown (10YR 5/4) very cobbly loam, dark yellowish brown (10YR 3/4) moist; weak very fine and weak fine granular structure; friable, soft, nonsticky, nonplastic; common fine, many medium, and common very fine roots; many fine and many very fine interstitial pores; 20 percent 2- to 75-millimeter and 25 percent 76- to 250-millimeter nonflat subangular indurated mixed rock fragments; slightly acid, pH 6.4; clear wavy boundary.

Bw1—22 to 77 centimeters; yellowish brown (10YR 5/4) extremely cobbly sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; very friable, slightly hard, nonsticky, nonplastic; few fine and few medium roots; common fine

and few coarse tubular pores; 30 percent 2- to 76-millimeter and 35 percent 73- to 250-millimeter mixed rock fragments; slightly acid, pH 6.4; gradual wavy boundary.

Bw2—77 to 146 centimeters; light yellowish brown (10YR 6/4) extremely cobbly sandy loam, brown (10YR 4/3) moist; moderate fine and moderate medium subangular blocky structure; friable, slightly hard, nonsticky, nonplastic; few fine and few medium roots; common fine and few fine tubular pores; 15 percent 250- to 600-millimeter, 20 percent 2- to 76-millimeter, and 40 percent 76- to 250-millimeter nonflat subangular indurated mixed rock fragments; slightly acid, pH 6.4; gradual wavy boundary.

C—146 to 154 centimeters; pale brown (10YR 6/3) extremely stony sandy loam, dark yellowish brown (10YR 4/4) moist; massive; friable, slightly hard, nonsticky, nonplastic; few very fine roots; common fine and common very fine interstitial pores; 15 percent 2- to 76-millimeter, 20 percent 250- to 600-millimeter, and 45 percent 76- to 250-millimeter nonflat subangular indurated mixed rock fragments; neutral, pH 6.6.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Soil temperature: 8 to 15 degrees F at a depth of 50 inches

Depth to lithic or paralithic contact: 50 to 152 inches

A horizons:

Dry color—10YR 5/4, 5/2, 4/2, or 3/3 or 2.5Y 4/2

Moist color—10YR 4/3, 3/4, 3/2, or 2/2; 7.5YR 3/2; 2.5Y 3/2; or 5Y 4/1

Texture—gravelly loam, very gravelly loam, cobbly loam, very cobbly loam, or very gravelly sandy loam

Rock fragment content—5 to 50 percent

Reaction—moderately acid to mildly alkaline (pH 5.6 to 7.8)

B horizons:

Dry color—10YR 6/4, 6/3, 6/1, 5/4, 5/2, or 5/1; 7.5YR 4/4; or 2.5Y 6/2

Moist color—10YR 5/4, 4/4, 4/3, or 3/4; 7.5YR 4/4; or 2.5Y 5/2

Texture—very gravelly loam, very cobbly loam, extremely cobbly loam, very gravelly sandy loam, extremely cobbly sandy loam, or very gravelly sandy clay loam

Rock fragment content—20 to 90 percent

Reaction—strongly acid to neutral (pH 5.1 to 7.3)

C horizon:

Dry color—10YR 6/4, 6/3, or 5/4

Moist color—10YR 5/4, 4/4, or 4/3

Texture—very gravelly sandy loam, extremely stony sandy loam, or very gravelly loamy sand

Reaction—moderately acid to neutral (pH 5.6 to 7.3)

Figure 57.—Representative profile of the Osito series. Scale is in centimeters.

Osito Series

The Osito series consists of shallow, well drained soils that formed in material weathered from sandstone. These soils are on hills and mountains. Slopes range from 10 to 65 percent. The mean annual precipitation is about 468 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, thermic, shallow Typic Haploxerepts

Typical Pedon (fig. 57)

Osito sandy loam in an area of Osito-Kawenga association, 20 to 65 percent slopes; Los Angeles County, California; Griffith Park, on upper backslope of linear side slope of lower spur from Vista De Valle fire road, one spur south of water tower on fire road, 200 meters down the tail and on the southern slope; 34 degrees 8 minutes 16.02 seconds N. latitude and 118 degrees 17 minutes 24.33 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Burbank, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 8 centimeters; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to weak fine granular; very friable, slightly hard, slightly sticky, slightly plastic; common very fine roots; common very fine interstitial pores; slightly acid, pH 6.3; clear wavy boundary.

Bw—8 to 33 centimeters; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; friable, slightly hard, slightly sticky, slightly plastic; few fine and few very fine roots; few fine tubular and common very fine interstitial pores; faint clay bridges between sand grains; slightly acid, pH 6.5; clear smooth boundary.

Cr—33 to 58 centimeters; weakly cemented sandstone.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 20 degrees C
Depth to paralithic contact: 25 to 55 cm to moderately cemented sandstone
Cambic horizon: 15- to 35-cm-thick subsurface horizon with weak subangular blocky structure below the surface horizon

A horizon:
Dry color—10YR 5/3 or 6/3
Moist color—10YR 3/2, 3/3, 4/2, or 4/3
Texture—sandy loam or loam

Bw horizon:
Dry color—10YR 6/3, 6/4, or 7/4
Moist color—10YR 4/3, 4/4, or 5/4
Texture—sandy loam or loam
Structure—weak subangular blocky

Pacheco Series

The Pacheco series consists of very deep, somewhat poorly drained soils that formed in alluvium derived mostly from sedimentary rocks. These soils are on flood plains. Slopes range from 0 to 2 percent. The mean annual precipitation is about 350 millimeters, and the mean annual temperature is about 17 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Fluvaquentic Haploxerolls

Typical Pedon

Pacheco loam in an area of Urban land-Aquic Xerorthents, graded-Pacheco, warm complex, 0 to 2 percent slopes; Los Angeles County, California; Playa Vista, 45 meters south and 5 meters west of the intersection of Randal and Lucile Streets; 33 degrees 59 minutes 0.64 second N. latitude and 118 degrees 24 minutes 35.42 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Venice, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 5 centimeters; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; friable, slightly hard, moderately sticky, moderately plastic; slightly effervescent; slightly alkaline, pH 7.6; clear wavy boundary.
^Au—5 to 45 centimeters; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; firm, very hard, very sticky, moderately plastic; distinct pressure faces on all peds; pressure faces are remnants of the source material and formed prior to transport; 5 percent fine distinct irregular light gray (10YR 7/1) carbonate masses in matrix; 5 percent 2- to 75-millimeter mixed rock fragments; 1 percent glass, 2 percent bitumen (asphalt), and 3 percent concrete fragments; strongly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.
2A—45 to 70 centimeters; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; friable, hard, very sticky, moderately plastic; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

2Bk1—70 to 110 centimeters; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; 2 percent fine distinct irregular yellowish brown (10YR 5/8) iron-manganese masses in matrix and 3 percent medium distinct irregular grayish brown (10YR 5/2) iron depletions in matrix; finely disseminated carbonate and 5 percent fine distinct irregular light gray (10YR 7/1) carbonate masses in matrix; strongly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

2Bk2—110 to 140 centimeters; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; very friable, nonsticky, nonplastic; 1 percent fine distinct irregular yellowish brown (10YR 5/6) iron-manganese masses in matrix and 5 percent medium prominent irregular grayish brown (10YR 5/2) iron depletions in matrix; 5 percent fine distinct irregular light gray (10YR 7/1) and 5 percent fine distinct irregular light gray (10YR 7/1) carbonate masses in matrix; violently effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

2Bkg—140 to 170 centimeters; light yellowish gray (10YR 6/2) loamy fine sand, grayish brown (10YR 5/2) moist; massive; very friable, nonsticky, nonplastic; 20 percent medium prominent irregular yellowish brown (10YR 5/8) iron-manganese masses in matrix; 5 percent fine distinct irregular light gray (10YR 7/1) and 5 percent fine distinct irregular light gray (10YR 7/1) carbonate masses in matrix; violently effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Soil moisture: Soil becomes moist between a depth of about 10 and 40 cm some time between October and December and remains moist until April or May; except where drained, the soil is saturated within a depth of 90 cm from about February until April or May; soil is dry the rest of the year

Mean annual soil temperature: 17 to 20 degrees C

Thickness of human-transported materials: 25 to 75 cm; typically less than 50 cm

Redoximorphic features: Iron-manganese masses and iron depletions occur at a depth of 50 to 90 cm; iron depletions dominate the matrix color at a depth of 125 cm or more; most areas are drained and do not have a seasonal high water table

Textures in the particle-size control section: Clay loam, silt loam, loam, or fine sandy loam; there is some stratification and texture is coarse below a depth of 100 cm

Rock fragment content: Less than 20 percent; less than 5 percent in most pedons

^A or ^Au horizon:

Dry color—2.5Y or 10YR 4/2, 4/3, 5/2, or 5/3
Moist color—2.5Y or 10YR 2/2, 3/2, or 3/3
Texture—loam or clay loam

A or 2A horizon:

Dry color—2.5Y or 10YR 4/2, 4/3, 5/2, or 5/3
Moist color—2.5Y or 10YR 2/2, 3/2, 3/3, 4/2, or 4/3
Texture—clay loam or loam
Organic matter content—2 to 4 percent; decreasing irregularly to an average of less than 1 percent at a depth of 50 cm below the natural surface
Reaction—slightly acid to moderately alkaline

Bk or 2Bk horizon:

Moist color—2.5Y or 10YR 3/2, 4/3, 5/3, 5/4, or 6/4
Texture—loam or sandy loam
Reaction—slightly acid to moderately alkaline
Calcium carbonate—few or common threads or masses

Bkg or 2Bkg horizons:

Moist color—2.5Y or 10YR 5/1, 5/2, 6/1, or 6/2

Figure 58.—An area of Pachic Haploxerolls. Photo taken looking west from the Baldwin Hills Scenic Overlook.

Texture—loamy sand or sandy loam
Reaction—slightly alkaline or moderately alkaline
Calcium carbonate—few or common threads or masses

Pachic Haploxerolls

Pachic Haploxerolls are very deep, well drained soils that formed in residuum and/or colluvium weathered from sandstone. These soils are on rounded hills (fig. 58). Slopes range from 20 to 75 percent. The mean annual precipitation is about 400 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Pachic Haploxerolls

Typical Pedon (fig. 59)

Pachic Haploxerolls in an area of Longshore-Pachic Haploxerolls complex, 20 to 55 percent slopes; Los Angeles County, California; Culver City, on the side slope of a hill at the Baldwin Hills Scenic Overlook; 34 degrees 1 minute 8.69 seconds N. latitude and 118 degrees 22 minutes 58.25 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Beverly Hills, California. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 4 centimeters; slightly decomposed plant material; abrupt wavy boundary.

A1—4 to 22 centimeters; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate medium granular; friable, slightly hard, nonsticky, nonplastic; common very fine roots throughout; common fine and very fine irregular pores; 2 percent nonflat subangular indurated 5- to 75-millimeter mixed rock fragments; slightly acid, pH 6.5; abrupt wavy boundary.

A2—22 to 57 centimeters; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; weak coarse subangular blocky structure; friable, moderately hard, nonsticky, nonplastic; common very fine roots throughout; common fine and very fine tubular pores; 2 percent nonflat subangular indurated

Figure 59.—Representative profile of Pachic Haploxerolls. Scale is in centimeters.

5- to 75-millimeter mixed rock fragments; slightly acid, pH 6.4; clear smooth boundary.

A3—57 to 105 centimeters; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; weak coarse subangular blocky structure; friable, moderately hard, nonsticky, nonplastic; common very fine roots throughout; common fine and common medium tubular pores; 2 percent nonflat subangular indurated 5- to 75-millimeter mixed rock fragments; slightly acid, pH 6.4; clear smooth boundary.

Bw1—105 to 130 centimeters; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure and massive; friable, moderately hard, slightly sticky, nonplastic; few very fine roots throughout; common fine and very fine irregular pores; 1 percent nonflat subangular indurated 5- to 75-millimeter mixed rock fragments; slightly acid, pH 6.5; clear smooth boundary.

Bw2—130 to 150 centimeters; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure and massive; very friable, slightly hard, nonsticky, nonplastic; few very fine roots throughout; common very fine irregular pores; 2 percent nonflat subangular indurated 5- to 75-millimeter mixed rock fragments; neutral, pH 6.6.

Range in Characteristics

Note: These soils are mapped at the subroup level due to their small extent and variable properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C
Clay content: 6 to 16 percent
Organic matter content: 1 to 3 percent in the upper 50 cm or deeper; gradually decreasing to less than 1 percent

A horizons:
Dry color—10YR 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR 2/2, 3/2, or 3/3
Texture—sandy loam or loam

Bw horizons:
Dry color—10YR 3/2, 3/3, 4/2, 4/3, 4/4, 5/3, or 5/4
Moist color—10YR 2/2, 3/2, 3/3, 4/2, or 4/3
Texture—sandy loam or loam

Padova Series

The Padova series consists of deep, well drained soils that formed in residuum from gneiss and igneous rock sources. These soils are on foothills. Slopes range from 15 to 55 percent. The mean annual precipitation is about 584 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Mollic Haploxeralfs

Typical Pedon (fig. 60)

Padova sandy loam in an area of Padova-Walong complex, 30 to 85 percent slopes; Los Angeles County, California; 34 degrees 8 minutes 47 seconds N. latitude and 117 degrees 42 minutes 21 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Mount Baldy, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 22 centimeters; brown (10YR 5/3) broken face sandy loam, dark brown (10YR 3/3) moist; moderate fine and weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; 1 percent subangular gneiss cobbles and 5 percent subangular gneiss gravel; neutral, pH 6.8; clear wavy boundary.
Bt1—22 to 39 centimeters; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; moderate fine and weak coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; 5 percent faint clay bridges between sand grains; 1 percent subangular gneiss cobbles and 5 percent subangular gneiss gravel; neutral, pH 7.2; clear wavy boundary.
Bt2—39 to 60 centimeters; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; moderately hard, friable,

Figure 60.—Representative profile of the Padova series. Photo taken at Claremont Hills Wilderness Park. Scale is in centimeters.

slightly sticky, slightly plastic; 20 percent distinct clay films on all faces of peds; 8 percent subangular gneiss gravel; slightly alkaline, pH 7.4; gradual wavy boundary.

Bt3—60 to 85 centimeters; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate fine subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; 20 percent distinct clay films on all faces of peds; 6 percent subangular gneiss gravel; slightly alkaline, pH 7.4; gradual wavy boundary.

Bt4—85 to 105 centimeters; yellowish red (5YR 5/6) gravelly sandy loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, nonsticky, nonplastic; 20 percent distinct clay films on all faces of peds; 20 percent subangular gneiss gravel; neutral, pH 7.2; diffuse wavy boundary.

R—105 to 200 centimeters; indurated gneiss.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 to 90 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C
Rock fragment content: 0 to 5 percent, by volume
Depth to lithic contact: Typically more than 100 cm; bedrock has areas with fractures less than 10 cm apart, but it is still dominantly more than strongly cemented
Clay content: 18 to 34 percent
Depth to argillic horizon: 11 to 85 cm
Reaction: Neutral or slightly alkaline
Surface fragments: 5 to 20 percent

A horizon:
Dry color—10YR 4/2, 4/3, 5/3, 5/4, or 5/2
Moist color—10YR 3/2, 3/3, 2/2, or 4/4
Texture—loamy sand, loam, or sandy loam
Clay content—6 to 17 percent
Rock fragments—0 to 25 percent gravel

Bt horizons:
Dry color—10YR 4/2, 4/3, 5/2, or 5/3 or 7.5YR 4/4, 5/4, or 6/4
Moist color—10YR 3/2, 3/3, or 4/2 or 7.5YR 4/4, 4/6, or 5/4
Texture—clay loam, sandy clay, sandy clay loam, gravelly sandy loam, sandy loam, or loam
Clay content—10 to 36 percent
Rock fragments—0 to 35 percent gravel

Palmview Series

The Palmview series consists of very deep, well drained soils that formed in alluvium from granitic or related rock sources. These soils are on alluvial fans. Slopes range from 0 to 15 percent. The mean annual precipitation is about 465 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, nonacid, thermic Typic Xerorthents

Typical Pedon (fig. 61)

Palmview fine sandy loam in an area of Urban land-Palmview-Tujunga complex, 0 to 5 percent slopes; Los Angeles County, California; Palmview Park in West Covina, beyond right field fence of baseball diamond near pavilion; 34 degrees 4 minutes 54 seconds N. latitude and 117 degrees 55 minutes 3 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Baldwin Park, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 12 centimeters; brown (10YR 4/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, friable, slightly sticky, nonplastic; common very fine and fine roots throughout; common very fine interstitial pores; 1 percent gravel; slightly alkaline, pH 7.5; clear wavy boundary.
^Au—12 to 39 centimeters; brown (10YR 4/3) fine sandy loam, 60 percent dark brown (10YR 3/3) and 40 percent very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, slightly sticky, nonplastic; common very fine and fine roots throughout; common very fine interstitial and common fine tubular pores; 1 percent

Figure 61.—Representative profile of the Palmview series. Photo taken at Palmview Park in West Covina. Scale is in centimeters.

gravel; 1 percent artifacts, PVC pipe shards; moderately alkaline, pH 8.0; clear wavy boundary.

2C1—39 to 115 centimeters; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky, nonplastic; common very fine roots throughout; many very fine interstitial and common fine tubular pores; 1 percent gravel; moderately alkaline, pH 8.0; clear wavy boundary.

2C2—115 to 140 centimeters; pale brown (10YR 6/3) fine sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky, nonplastic; common very fine roots throughout; common very fine interstitial pores; 1 percent gravel; moderately alkaline, pH 8.0; clear wavy boundary.

2C3—140 to 200 centimeters; pale brown (10YR 6/3) fine sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky, nonplastic; 1 percent gravel; moderately alkaline, pH 8.0.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 20 degrees C

Rock fragment content: Typically 0 to 15 percent; some pedons have up to 35 percent in areas immediately below canyons

Artifacts: 0 to 5 percent innocuous trash in the ^Au or ^Cu horizon

Reaction: Slightly acid or neutral in upper part of profile and slightly acid to slightly alkaline in lower part
Clay content: 5 to 16 percent

A, ^Au, or Ap horizon:
Dry color—2.5Y or 10YR 4/2, 4/3, 5/2, 5/3, or 6/3
Moist color—2.5Y or 10YR 2/2, 3/1, 3/2, 3/3, or 3/4
Texture—sandy loam, fine sandy loam, loam, loamy sand, or loamy fine sand
Rock fragment content—0 to 35 percent
Artifacts—0 to 10 percent

C, 2C, ^C, or ^Cu horizons:
Dry color—2.5Y or 10YR 4/3, 4/4, 5/3, 5/4, 6/3, 6/4, 7/3, or 7/4
Moist color—2.5Y or 10YR 3/3, 3/4, 4/2, 4/3, 4/4, 5/3, or 5/4
Texture—sandy loam, fine sandy loam, loam, loamy sand, loamy fine sand, or sand
Rock fragment content—0 to 35 percent
Artifacts—0 to 5 percent

Pico Series

The Pico series consists of very deep, well drained soils that formed in alluvium from mixed sources. These soils are on flood plains and alluvial fans. Slopes range from 0 to 9 percent. The mean annual precipitation is about 360 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Fluventic Haploxerolls

Typical Pedon

Pico loam in an area of Urban land-Metz-Pico complex, 0 to 2 percent slopes; Los Angeles County, California; City of Carson, 285 meters north and 65 meters east of the intersection of 213th Street and Martin Street; 33 degrees 50 minutes 17.00 seconds N. latitude and 118 degrees 14 minutes 37.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Long Beach, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 12 centimeters; dark grayish brown (10yr 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; very friable, soft, slightly sticky, slightly plastic; few medium and many very fine roots; common very fine tubular pores; slightly alkaline, pH 7.6; clear wavy boundary.
A2—12 to 45 centimeters; brown (10YR 4/3) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; very friable, soft, slightly sticky, slightly plastic; few medium and common very fine roots; few fine and very fine tubular pores; finely disseminated carbonate; slightly effervescent; slightly alkaline, pH 7.6; gradual wavy boundary.
AB—45 to 120 centimeters; brown (10YR 4/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; very friable, soft, nonsticky, nonplastic; few very fine roots; finely disseminated carbonate; strongly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.
Bk—120 to 200 centimeters; light yellowish brown (2.5 6/3) fine sand, olive brown (2.5Y 4/3) moist; massive; loose, loose, nonsticky, nonplastic; few very fine roots; 1 percent fine faint carbonate masses in matrix; very slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 20 degrees C
Texture of the particle-size control section: Sandy loam, fine sandy loam, or loam; there is slight to distinct stratification in some part of the profile
Clay content: Average of 8 to 16 percent in the particle-size control section
Rock fragment content: Typically none; ranging from 0 to about 10 percent
Reaction: Slightly alkaline or moderately alkaline
Effervescence: Slight to strong throughout the control section
Calcium carbonate: Few or common calcium carbonate masses below a depth of about 50 cm; some pedons do not have carbonate masses
Organic matter content: 1.5 to 3 percent at the surface; decreasing irregularly to less than 1 percent at a depth of 50 cm

A horizons:
Dry color—2.5Y or 10YR 4/3, 5/2, or 5/3
Moist color—2.5Y or 10YR 2/2, 3/2, or 3/3
Texture—loam, fine sandy loam, sandy loam, or very fine sandy loam

Bk horizons (if they occur):
Dry color—2.5Y or 10YR 4/2, 4/3, 5/2, 5/3, 5/4, or 6/3
Moist color—2.5Y or 10YR 3/3, 3/4, 4/2, 4/3, or 5/3
Texture—loam, fine sandy loam, sandy loam, or very fine sandy loam

C horizons (if they occur):
Dry color—2.5Y or 10YR 4/3, 5/3, 6/2, 6/3, or 7/2
Moist color—2.5Y or 10YR 3/3, 3/4, 4/2, 4/3, or 5/3
Texture—loam, fine sandy loam, sandy loam, loamy fine sand, or fine sand

Pierview Series

The Pierview series consists of very deep, well drained soils that formed in alluvium weathered from slate and other sedimentary sources. These soils are on remnant alluvial fans and terraces, typically in urban areas where surface modification is common (fig. 62). Slopes range from 0 to 12 percent. The mean annual precipitation is about 410 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Haplic Palexeralfs

Typical Pedon

Pierview loam in an area of Urban land-Sepulveda-Pierview complex, 2 to 12 percent slopes; Los Angeles County, California; Douglass Park in Santa Monica; 34 degrees 2 minutes 8 seconds N. latitude and 118 degrees 28 minutes 48 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Beverly Hills, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 6 centimeters; brown (7.5YR 5/3) loam, dark brown (7.5YR 3/2) moist; weak coarse subangular blocky structure; hard, friable, moderately sticky, moderately plastic; common very fine roots; common fine tubular pores; slightly alkaline, pH 7.5; clear wavy boundary.
^Cu—6 to 28 centimeters; light brown (7.5YR 6/3) loam, dark brown (7.5YR 3/3) moist; massive; very hard, friable, moderately sticky, moderately plastic; few very

Figure 62.—An area of Pierview soil (uppermost reddish band at top of escarpment) at the wave cut terrace along the California Incline in Santa Monica. The grayish layer of gravelly alluvium occurring below the Pierview soil occurs intermittently within 200 centimeters of the surface.

fine roots; few fine and very fine tubular pores; 2 percent gravel; 3 percent 2- to 75-millimeter artifacts; slightly alkaline, pH 7.4; abrupt smooth boundary.

2Bt1—28 to 90 centimeters; light brown (7.5YR 6/3) loam, brown (7.5YR 4/3) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; few fine and very fine tubular pores; few distinct clay films on all faces of peds; 2 percent gravel; neutral, pH 7.0; clear wavy boundary.

2Bt2—90 to 130 centimeters; dull brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; firm, moderately sticky, moderately plastic; common very fine and fine tubular pores; common distinct clay films on all faces of peds; 2 percent gravel; neutral, pH 7.0; gradual wavy boundary.

2Bt3—130 to 170 centimeters; dull yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; firm, moderately sticky, moderately plastic; common very fine tubular pores; common distinct clay films on all faces of peds; 5 percent gravel; neutral, pH 7.0; gradual wavy boundary.

2Bt4—170 to 185 centimeters; dull yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; common very fine tubular pores; few distinct clay films on all faces of peds; neutral, pH 7.1.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May; soil is dry the rest of the year

Mean annual soil temperature: 17 to 20 degrees C

Rock fragments: 0 to 15 percent gravel throughout the profile

Reaction: Neutral to moderately alkaline

Clay content: 18 to 35 percent; no clay decrease of 20 percent or more (relative) from the maximum clay content within 150 cm of the mineral soil surface

A, ^A, or ^Au horizon:
Dry color—10YR or 7.5YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR or 7.5YR 2/2, 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—loam, fine sandy loam, or silt loam
Rock fragments—0 to 15 percent gravel
Artifacts—0 to 10 percent variable construction debris

^C or ^Cu horizon:
Dry color—10YR or 7.5YR 4/3, 4/4, 5/3, or 6/3
Moist color—10YR or 7.5YR 3/3, 4/3, 4/4, 4/6, or 5/4
Texture—loam, clay loam, or fine sandy loam
Rock fragments—0 to 15 percent gravel
Artifacts—0 to 10 percent variable construction debris

2Bt or Btk horizons:
Dry color—10YR or 7.5YR 4/4, 5/3, 5/4, 6/3, or 6/4
Moist color—10YR or 7.5YR 3/3, 4/3, 4/4, 4/6, or 5/4
Texture—loam, clay loam, or silty clay loam; some pedons have clay below the control section
Rock fragments—0 to 15 percent gravel; some pedons have a gravelly substratum

BC or 2BC horizon (if it occurs):
Moist color—10YR or 7.5YR 4/4, 5/2, 5/3, 5/4, or 6/4
Texture—loam or clay loam
Rock fragments—0 to 15 percent gravel; some pedons are gravelly in the substratum at a depth of typically more than 150 cm

San Andreas Family

The San Andreas family consists of deep, well drained soils that formed in material weathered from gneissic, granitic, or sedimentary rocks. These soils are on mountainsides (mainly on toeslopes), ridges, colluvial slopes, and old terraces or fans. Elevation ranges from 375 to 970 meters. Slopes range from 15 to 60 percent. Annual precipitation ranges from 460 to 760 millimeters.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls

Typical Pedon (fig. 63)

San Andreas family loam in an area of Trigo-Modesto-San Andreas families association, 15 to 70 percent slopes; Los Angeles County, California; in the Little Tujunga Canyon area, about 80 yards southeast of gate to the Angeles Gun Club, northeast side of the road; 34 degrees 17 minutes 51.57 seconds N. latitude and 118 degrees 20 minutes 47.92 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Sunland, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 41 centimeters; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure; friable, slightly hard, slightly sticky, slightly plastic; few fine, few medium, and many very fine roots; many fine and many very fine interstitial and many fine and many very fine tubular pores; neutral, pH 6.6; gradual wavy boundary.

Bw—41 to 81 centimeters; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; firm, slightly hard, slightly

Figure 63.—Location of representative profile of the San Andreas family in the Angeles National Forest.

sticky, slightly plastic; few medium roots; many fine and many medium tubular pores; neutral, pH 6.8; diffuse smooth boundary.

C1—81 to 117 centimeters; light brownish gray (2.5Y 6/2) sandy loam, brown (10YR 5/3) moist; massive; firm, slightly hard, nonsticky, nonplastic; few medium roots; few fine and few medium tubular pores; neutral, pH 6.8; diffuse smooth boundary.

C2—117 to 152 centimeters; light brownish gray (10YR 6/2) sandy loam, brown (10YR 5/3) moist; massive; firm, slightly hard, nonsticky, nonplastic; neutral, pH 6.8.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Soil temperature: 8 to 15 degrees C at a depth of 50 cm

Depth to paralithic or lithic contact: 50 to 110 cm

A horizon:

Dry color—10YR 6/3, 6/2, 5/3, 5/2, 4/3, or 4/2

Moist color—10YR 4/4, 4/3, 3/3, 3/2, or 2/2

Texture—gravelly loamy sand, extremely gravelly loamy coarse sand, or very cobbly coarse sand

Rock fragment content—30 to 80 percent

Reaction—moderately acid to neutral (pH 5.6 to 7.3)

Note—horizon is 25 to 38 cm thick in some pedons

C horizons:

Dry color—10YR 8/2, 7/3, 7/2, 6/4, 6/3, or 6/2

Moist color—10YR 6/3, 5/4, 5/2, 4/4, or 4/3
Texture—gravelly loamy sand, extremely gravelly loamy sand, extremely cobbly loamy coarse sand, or gravelly sand
Rock fragment content—35 to 90 percent
Reaction—strongly acid to mildly alkaline (pH 5.1 to 7.8)
Note—horizon grades to weathered or unweathered granodiorite rock

San Benito Series

The San Benito series consists of deep, well drained soils that formed in colluvium and/or residuum weathered from calcareous shale. These soils are on hills and marine terrace risers. Slopes range from 30 to 75 percent. The mean annual precipitation is about 388 millimeters, and the mean annual temperature is about 17.2 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls

Typical Pedon

San Benito clay loam in an area of Lunada-San Benito, warm complex, 30 to 75 percent slopes; Los Angeles County, California; Palos Verdes Nature Preserve, at the Filiorum Reserve, on a steep side slope; 33 degrees 45 minutes 21.02 seconds N. latitude and 118 degrees 22 minutes 15.55 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Torrance, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 25 centimeters; grayish brown (10YR 5/2) clay loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; friable, soft, moderately sticky, moderately plastic; few fine and common very fine roots; common medium and many very fine tubular pores; 3 percent flat angular 2- to 5-millimeter and 5 percent flat angular 6- to 150-millimeter calcareous shale fragments; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.
Btk1—25 to 60 centimeters; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; friable, slightly hard, moderately sticky, moderately plastic; common very fine tubular pores; common clay films on surfaces along pores; 5 percent fine prominent irregular white (10YR 8/1) carbonate masses in matrix; 5 percent flat angular 2- to 5-millimeter and 5 percent flat angular 6- to 150-millimeter calcareous shale fragments; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.
Btk2—60 to 120 centimeters; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; friable, moderately sticky, moderately plastic; common very fine tubular pores; common clay films on surfaces along pores; 5 percent fine prominent irregular white (10YR 8/1) carbonate masses in matrix; 6 percent flat angular 2- to 5-millimeter and 6 percent flat angular 6- to 150-millimeter calcareous shale fragments; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.
Cr—120 centimeters; moderately cemented calcareous shale.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 17 to 20 degrees C
Depth to paralithic contact: 100 to 150 cm to moderately cemented calcareous shale
Clay content: 18 to 32 percent

Rock fragment content: 5 to 15 percent throughout the profile
Organic matter content: 1.5 to 4 percent in the upper 50 cm and more than 1 percent to a depth of 75 cm or more

A horizon:
Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/2, 3/1, 3/2, or 3/3
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline
Calcium carbonate—disseminated calcium carbonate

Btk or Bk horizons:
Dry color—10YR 5/2, 5/3, or 6/3
Moist color—10YR 3/2, 3/3, 4/2, or 4/3
Texture—clay loam or loam
Reaction—slightly alkaline or moderately alkaline
Calcium carbonate—few or common calcium carbonate masses along with disseminated calcium carbonate

San Emigdio Series

The San Emigdio series consists of very deep, well drained soils that formed in alluvium derived from mixed sources. These soils are on alluvial fans and flood plains. Slopes range from 0 to 5 percent. The mean annual precipitation is about 352 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, calcareous, thermic Typic Xerofluvents

Typical Pedon

San Emigdio fine sandy loam in an area of Urban land-Hueneme, drained-San Emigdio complex, 0 to 2 percent slopes; Los Angeles County, California; El Dorado Regional Park in the City of Long Beach, 250 meters east and 290 meters south of the intersection of Wardlow Road and Stevely Avenue; 33 degrees 48 minutes 59.00 seconds N. latitude and 118 degrees 5 minutes 24.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Los Alamitos, California. (Colors are for dry soil unless other noted.)

A—0 to 10 centimeters; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.
C1—10 to 40 centimeters; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; friable, slightly sticky, nonplastic; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.
C2—40 to 50 centimeters; pale yellow (2.5Y 7/3) and light yellowish brown (2.5Y 6/3) silt loam, light olive brown (2.5Y 5/3) and olive brown (2.5Y 4/3) moist; massive; friable, slightly sticky, slightly plastic; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.
C3—50 to 100 centimeters; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; very friable, nonsticky, nonplastic; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.
C4—100 to 150 centimeters; pale yellow (2.5y 7/3) loamy sand, light olive brown (2.5Y 5/3) moist; massive; very friable, nonsticky, nonplastic; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 20 degrees C
Human-transported materials: Some pedons have a thin layer (less than 50 cm) of human-transported materials overlying an intact natural soil, typically for turf establishment
Clay content: Less than 18 percent throughout the profile
Reaction: Slightly alkaline or moderately alkaline
Calcium carbonate: Disseminated calcium carbonate occurs throughout the profile in most pedons; some pedons have fine calcium carbonate masses in the subsurface

A horizon:
Dry color—2.5Y or 10YR 5/2, 5/3, 6/2, or 6/3
Moist color—2.5Y or 10YR 2/2, 3/2, 3/3, 4/2, or 4/3
Texture—fine sandy loam, sandy loam, or loam

C horizons:
Dry color—2.5Y or 10YR 7/2, 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, 7/3, or 7/4
Moist color—2.5Y or 10YR 4/2, 4/3, 5/3, 5/4, or 6/3
Texture—fine sandy loam, sandy loam, or loam; typically horizon has some stratification

Sapwi Series

The Sapwi series consists of well drained soils that are moderately deep to bedrock and that formed in residuum and colluvium derived from sandstone. These soils are on hills and mountains. Slopes range from 15 to 75 percent. The mean annual precipitation is about 560 millimeters, and the mean annual air temperature is about 17.7 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Pachic Argixerolls

Typical Pedon

Sapwi loam, 30 to 75 percent slopes; Los Angeles County, California; about 2.5 miles northeast of Leo Carrillo State Beach and Highway 1; 34 degrees 4 minutes 58.00 seconds N. latitude and 118 degrees 54 minutes 48.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Triunfo Pass, California. (Colors are for dry soil unless otherwise noted.)

Oe—0 to 3 centimeters; slightly decomposed plant material; clear smooth boundary.
A—3 to 10 centimeters; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; very friable, slightly hard, slightly sticky, nonplastic; common very fine roots; few very fine interstitial pores; 5 percent subangular very weakly cemented 2- to 5-millimeter sandstone fragments; neutral, pH 6.6; clear smooth boundary.
Bt1—10 to 28 centimeters; dark brown (10YR 3/3) stony clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; very friable, slightly hard, moderately sticky, slightly plastic; common very fine to coarse roots; common very fine to coarse tubular pores; 15 percent faint clay films on surfaces along pores and 15 percent faint clay films on all faces of peds; 5 percent subangular very strongly cemented 2- to 75-millimeter, 5 percent subangular very strongly

cemented 75- to 250-millimeter, and 5 percent subangular very strongly cemented 250- to 600-millimeter sandstone fragments; neutral, pH 6.7; clear wavy boundary.

Bt2—28 to 60 centimeters; dark brown (10YR 3/3) stony clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; friable, hard, moderately sticky, slightly plastic; common very fine to very coarse roots; common very fine to coarse tubular pores; 15 percent faint clay films on surfaces along pores and 15 percent faint clay films on all faces of peds; 5 percent subangular very strongly cemented 2- to 5-millimeter, 5 percent subangular very strongly cemented 75- to 250-millimeter, and 5 percent subangular very strongly cemented 250- to 600-millimeter sandstone fragments; neutral, pH 6.7; clear wavy boundary.

Bt3—60 to 95 centimeters; variegated 85 percent light yellowish brown (10YR 6/4) and 15 percent grayish brown (10YR 5/2) very stony clay loam, 85 percent dark yellowish brown (10YR 4/4) and 15 percent very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; common very fine to coarse roots; common very fine to coarse tubular pores; 15 percent faint clay films on surfaces along pores and 15 percent faint clay films on all faces of peds; 20 percent subangular very strongly cemented 250- to 600-millimeter, 20 percent subangular very strongly cemented 2- to 75-millimeter, and 20 percent subangular very strongly cemented 75- to 250-millimeter sandstone fragments; neutral, pH 6.6; abrupt wavy boundary.

R—95 to 98 centimeters; indurated bedrock.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Depth to lithic bedrock: 50 to 100 cm

Organic matter content: 2 to 4 percent

A horizon:

Dry color—10YR 4/3, 5/2, or 5/3

Moist color—10YR 2/2, 3/2, or 3/3

Clay content—12 to 27 percent

Rock fragment content—0 to 15 percent; lower part of horizon has 15 to 30 percent coarse fragments in some pedons

Bt horizons:

Dry color—10YR 3/3, 4/3, 4/4, 5/2, 5/3, 5/4, 6/3, or 6/4

Moist color—10YR 3/2, 3/3, 4/3, or 4/4

Texture—clay loam, loam, gravelly loam, cobbly loam, stony loam, gravelly clay loam, cobbly clay loam, or stony clay loam in upper part of horizon; very gravelly clay loam, very cobbly clay loam, or very stony clay loam in lower part

Clay content—18 to 35 percent

Rock fragment content—5 to 35 percent in upper part of horizon and 35 to 70 percent in lower part

Sepulveda Series

The Sepulveda series consists of well drained soils that formed in human-transported materials (HTM) on alluvial fan remnants that originate from sedimentary sources. These soils are on cut-and-filled and localized raised land in areas that have been graded. Slopes range from 0 to 15 percent. The mean annual precipitation is about 356 millimeters, and the mean annual air temperature is about 17 degrees C.

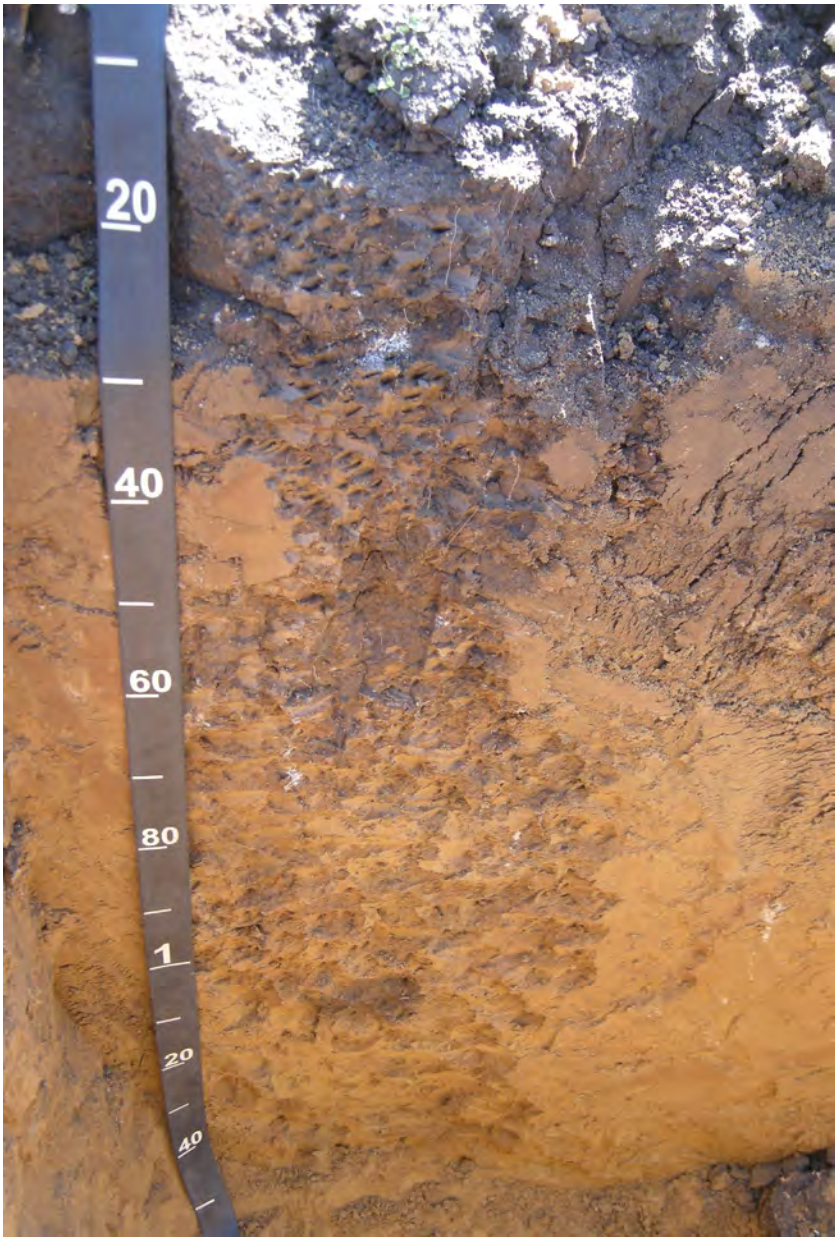


Figure 64.—Representative profile of the Sepulveda series. Human-transported materials extend to a depth of more than 150 centimeters. Scale is in centimeters.

Taxonomic Classification

Fine-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents

Typical Pedon (fig. 64)

Sepulveda clay loam in an area of Urban land-Sepulveda-Pierview complex, 2 to 12 percent slopes; Los Angeles County, California; Cheviot Hills Recreation Center, behind baseball field; 34 degrees 2 minutes 44 seconds N. latitude and 118 degrees 24 minutes 44 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Beverly Hills, California. (Colors are for dry soil unless otherwise noted.)

^Au—0 to 24 centimeters; very dark brown (10YR 2/2) clay loam, very dark brown (10YR 2/2) moist; moderate very coarse subangular blocky structure parting to moderate coarse subangular blocky; firm, extremely hard, moderately sticky, moderately plastic; common fine and very fine roots; common fine and very fine irregular pores; 1 percent gravel; 2 percent 2- to 75-millimeter artifacts; very slightly effervescent; neutral, pH 7.2; clear wavy boundary.

^C1—24 to 55 centimeters; 90 percent brown (7.5YR 4/4) and 10 percent very dark grayish brown (10YR 3/2) sandy clay loam, brown (7.5YR 4/2) moist; moderate medium subangular blocky structure; firm, extremely hard, very sticky, very plastic; common fine and very fine roots; common very fine irregular pores; many prominent clay films on all faces of peds; common coarse irregular white (10YR 8/1) calcium carbonate masses; few strong brown (7.5YR 4/6) pockets mixed into matrix; calcium carbonate masses and clay films are remnants of the source material; very slightly effervescent; slightly alkaline, pH 7.4; clear wavy boundary.

^C2—55 to 114 centimeters; 98 percent dark yellowish brown (10YR 4/4) and 2 percent dark grayish brown (10YR 4/2) sandy clay loam, 15 percent dark yellowish brown (10YR 4/6) and 85 percent dark yellowish brown (10YR 4/4) moist; massive; friable, moderately sticky, moderately plastic; common very fine irregular pores; many distinct clay films on faces of peds; common coarse irregular white (10YR 8/1) calcium carbonate masses; calcium carbonate masses and clay films are remnants of the source materials; very slightly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

^C3—114 to 188 centimeters; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; friable, moderately sticky, moderately plastic; common very fine irregular pores; common coarse irregular white (10YR 8/1) calcium carbonate masses; calcium carbonate masses are remnants of the source materials; very slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

^C4—188 to 200 centimeters; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; friable, slightly sticky, slightly plastic; few fine faint irregular yellowish brown (10YR 5/6) iron-manganese masses in matrix surrounding redox depletions and common medium distinct irregular grayish brown (10YR 5/2) iron depletions in matrix; slightly alkaline, pH 7.8.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Thickness of human-transported materials: Typically more than 100 cm; commonly morer than 200 cm

Rock fragments: 0 to 15 percent subrounded or mechanically abraded (broken) fragments

Reaction: Neutral to moderately alkaline

Artifacts: 0 to 15 percent construction debris (concrete, bricks, asphalt, and glass)

^A or ^Au horizon:

Dry color—10YR 2/2, 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR 2/2, 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—clay loam, loam, silt loam, or clay
Rock fragment content—0 to 10 percent
Artifacts—0 to 5 percent construction debris (concrete, bricks, asphalt, and glass)
Bulk density—typically 1.5 to 1.7 from compaction

^C or ^Cu horizons:
Dry color—10YR or 7.5YR 4/3, 4/4, 4/6, 5/3, 5/4, 5/6, 6/3, 6/4, 6/6, 7/3, 7/4, or 7/6
Moist color—10YR or 7.5YR 3/2, 3/3, 3/4, 4/3, 4/4, 4/6, 5/4, 5/6, or 6/4
Texture—dominantly clay loam, sandy clay loam, or loam; clay in some pedons
Clay content—18 to 42 percent
Rock fragment content—0 to 15 percent
Artifacts—0 to 10 percent construction debris (concrete, bricks, asphalt, and glass)

2Bt or 2Btk horizon (if it occurs):
Dry color—10YR or 7.5YR 5/4, 5/6, 6/4, 6/6, or 7/4
Moist color—10YR or 7.5YR 3/4, 4/4, 4/6, 5/4, or 6/4
Texture—loam, clay loam, sandy clay loam, or sandy loam
Calcium carbonate—masses of calcium carbonate occur in some pedons
Rock fragment content—0 to 5 percent; up to 25 percent in the substratum in some pedons

Soboba Series

The Soboba series consists of very deep, excessively drained soils that formed in alluvium from granitic sources. These soils are on alluvial fans and flood plains. Slopes range from 0 to 15 percent. The mean annual precipitation is about 510 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Sandy-skeletal, mixed, thermic Typic Xerofluvents

Typical Pedon (fig. 65)

Soboba very gravelly sand in an area of Soboba and Tujunga soils, 0 to 5 percent slopes, frequently flooded; Los Angeles County, California; Tujunga Wash, on side of stream terrace near Oro Vista Road, about 400 meters west of concrete barrier at Big Tujunga Wash recreation area to highwalls that are exposed from flooding events; 34 degrees 16 minutes 20.01 seconds N. latitude and 118 degrees 19 minutes 20.63 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Sunland, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 7 centimeters; light yellowish brown (2.5Y 6/3) very gravelly sand, light olive brown (2.5Y 5/3) moist; loose, loose, nonsticky, nonplastic; few coarse roots; common fine tubular pores; 2 percent rounded 76- to 250-millimeter and 35 percent rounded 2- to 75-millimeter granite fragments; slightly acid, pH 6.2; clear wavy boundary.

C1—7 to 38 centimeters; light yellowish brown (2.5Y 6/3) very gravelly sand, light olive brown (2.5Y 5/3) moist; loose, loose, nonsticky, nonplastic; few fine roots; common fine tubular and common very fine interstitial pores; 10 percent rounded 76- to 250-millimeter and 40 percent rounded 2- to 75-millimeter granite fragments; slightly acid, pH 6.5; gradual wavy boundary.

C2—38 to 155 centimeters; pale yellow (2.5Y 7/4) extremely gravelly sand, light olive brown (2.5Y 5/4) moist; loose, loose, nonsticky, nonplastic; few very fine roots; few fine interstitial pores; 15 percent rounded 76- to 250-millimeter and 45 percent rounded 2- to 75-millimeter granite fragments; neutral, pH 6.8; clear wavy boundary.

C3—155 to 200 centimeters; pale yellow (2.5Y 7/4) extremely cobbly sand, light olive brown (2.5Y 5/4) moist; loose, loose, nonsticky, nonplastic; few fine and few medium roots; 30 percent rounded 76- to 250-millimeter and 40 percent rounded 2- to 75-millimeter granite fragments; neutral, pH 6.8.

Figure 65.—Representative profile of the Soboba series, at Big Tujunga Wash recreation area to the west of Big Tujunga Road. Scale is in centimeters.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Human-transported materials (HTM): Developed areas typically have a thin layer of variable HTM less than 50 cm thick

Texture: Coarser than loamy very fine sand; very to extremely gravelly, cobbly, or stony

Reaction: Slightly acid or neutral in upper part of profile and neutral or slightly alkaline in lower part

A horizon:
Dry color—2.5Y or 10YR 4/2, 4/3, 5/3, 5/4, 6/3, or 6/4
Moist color—2.5Y or 10YR 3/2, 3/3, 4/2, 4/3, or 5/3
Texture—coarse sand, loamy sand, or sandy loam that is gravelly, cobbly, or stony
Rock fragment content—0 to 35 percent in the HTM and 20 to 50 percent in natural surface layers

C horizons:
Dry color—2.5Y or 10YR 5/3, 5/4, 5/6, 6/3, 6/4, 6/6, 7/3, or 7/4
Moist color—2.5Y or 10YR 4/2, 4/3, 4/4, 5/3, 5/4, 6/3, or 6/4
Texture—sand or loamy sand that is very to extremely gravelly, cobbly, or stony
Rock fragment content—35 to 75 percent
Note—darker colors and buried surface layers occur randomly in C horizons

Soper Series

The Soper series consists of moderately deep, well drained soils that formed in materials weathered from conglomerate and sandstone. These soils are on hills and uplands. Slopes range from 15 to 75 percent. The mean annual precipitation is about 477 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Typic Argixerolls

Typical Pedon

Soper loam in an area of Anaheim-Soper complex, 20 to 55 percent slopes; Los Angeles County, California; on a spur ridge crest 200 yards south of powerline easement, at Firestone Scout Reservation north of High Ridge Road; 33 degrees 57 minutes 44.48 seconds N. latitude and 117 degrees 48 minutes 54.93 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Yorba Linda, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 5 centimeters; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; moderate thick platy structure; friable, hard, slightly sticky, slightly plastic; common very fine roots; common very fine tubular pores; slightly acid, pH 6.5; abrupt wavy boundary.

Bt1—5 to 30 centimeters; dark grayish brown (10YR 4/2) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; common very fine roots; common fine irregular pores; 20 percent clay films on all faces of peds; 1 percent subangular weakly cemented 2- to 5-millimeter and 1 percent subangular weakly cemented 6- to 75-millimeter sandstone fragments; slightly acid, pH 6.5; gradual wavy boundary.

Bt2—30 to 60 centimeters; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; few very fine roots; common fine irregular pores; 25 percent clay films on all faces of peds; 1 percent subangular weakly cemented 2- to 5-millimeter and 1 percent subangular weakly cemented 6- to 75-millimeter sandstone fragments; neutral, pH 6.7; clear wavy boundary.

Bt3—60 to 90 centimeters; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) and yellowish brown (10YR 5/6) moist; weak medium subangular blocky structure; friable, hard, moderately sticky, moderately plastic; few fine irregular pores; 15

percent clay films on all faces of peds; 8 percent subangular weakly cemented 2- to 75-millimeter sandstone fragments; neutral, pH 6.8; clear wavy boundary.

Cr—90 to 115 centimeters; moderately cemented sandstone.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Depth to paralithic contact: 55 to 120 cm to moderately cemented sedimentary bedrock

Organic matter content: 1 to 4 percent to a depth of 25 cm; decreasing regularly to less than 1 percent at a depth of about 50 cm

A horizon:

Dry color—10YR 4/2, 4/3, or 5/3

Moist color—10YR 3/1, 3/2, or 3/3

Texture—loam, sandy loam, or sandy clay loam

Clay content—10 to 25 percent; some pedons with eroded surface horizons have more clay

Rock fragment content—0 to 15 percent

Bt horizons:

Dry color—7.5YR or 10YR 4/2, 4/3, 4/4, 5/4, 5/6, or 6/6

Moist color—7.5YR or 10YR 3/3, 3/4, 4/3, 4/4, 4/6, or 5/6

Texture—clay loam, loam, or sandy clay loam

Clay content—20 to 32 percent

Rock fragment content—0 to 15 percent; some pedons have up to 35 percent

Sorrento Series

The Sorrento series consists of very deep, well drained soils that formed in a thin layer of human-transported materials (HTM) over young alluvium derived from sedimentary sources. These soils are on alluvial fans and fan aprons. Slopes range from 0 to 9 percent. The mean annual precipitation is about 411 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls

Typical Pedon (fig. 66)

Sorrento loam in an area of Urban land-Sorrento-Arbolado complex, 2 to 9 percent slopes; Los Angeles County, California; Newton Middle School, Hacienda La Puente School District, 10 meters south of basketball court; 33 degrees 59 minutes 46.10 seconds N. latitude and 117 degrees 58 minutes 23.30 seconds W. longitude, WGS 84 – U.S.G.S. Quad: La Habra, California. (Colors are for dry soil unless otherwise noted.)

^Au1—0 to 8 centimeters; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate medium subangular blocky structure parting to moderate fine granular; friable, moderately hard, slightly sticky, moderately plastic; common medium and many very fine roots; many fine interstitial and common fine tubular pores; 1 percent 2- to 75-millimeter brick and 1 percent 2- to 75-millimeter plastic fragments; slightly alkaline, pH 7.6; clear wavy boundary.

^Au2—8 to 42 centimeters; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; friable, moderately

Figure 66.—Representative profile of the Sorrento series. A thin layer of human-transported materials overlies the truncated native soil (at a depth of 42 centimeters). The original surface layer has been removed and mixed into these materials. Scale is in centimeters.

hard, moderately sticky, very plastic; common fine and very fine roots; common medium and fine tubular pores; 5 percent distinct clay films on all faces of peds and 60 percent distinct pressure faces on all peds; 1 percent fine distinct irregular light gray (10YR 7/1) carbonate masses in matrix; 1 percent subangular 2- to 5-millimeter charcoal fragments and 2 percent subangular 2- to 75-millimeter mixed rock fragments; 1 percent 2- to 75-millimeter brick, 1 percent 2- to 75-millimeter bitumen (asphalt), and 2 percent 2- to 75-millimeter concrete fragments; discontinuous narrow dark yellowish brown (10YR 3/4) band at a depth of 38 centimeters; carbonate masses are remnants of the source material; slightly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

2Btk1—42 to 76 centimeters; very dark grayish brown (10YR 3/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; friable, moderately sticky, very plastic; common very fine roots; many fine and common medium tubular pores; 10 percent distinct clay films on surfaces along pores and 25 percent distinct pressure faces on all peds; 3 percent prominent threadlike white (10YR 8/1) carbonate masses in matrix; 2 percent subangular 2- to 75-millimeter sandstone fragments; strongly effervescent; moderately alkaline, pH 7.9; gradual wavy boundary.

2Btk2—76 to 99 centimeters; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to weak medium subangular blocky; friable, moderately sticky, very plastic; common very fine roots; common fine or very fine tubular pores; 15 percent distinct clay films on surfaces along pores and 25 percent distinct pressure faces on all peds; finely disseminated calcium carbonate and 3 percent prominent irregular white (10YR 8/1) carbonate masses in matrix; 2 percent subangular 2- to 75-millimeter sandstone fragments; strongly effervescent; moderately alkaline, pH 7.9; gradual wavy boundary.

2Bt1—99 to 180 centimeters; brown (10YR 4/3) clay loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; friable, moderately sticky, very plastic; common fine and very fine roots; common medium tubular, many very fine tubular, and common very fine irregular pores; 30 percent distinct clay films on surfaces along pores; finely disseminated carbonate; 2 percent subangular 2- to 75-millimeter sandstone fragments; very slightly effervescent; moderately alkaline, pH 7.9.

2Bt2—180 to 200 centimeters; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; friable, moderately sticky, very plastic; 5 percent distinct clay films on surfaces along pores; finely disseminated carbonate; very slightly effervescent; moderately alkaline, pH 8.1.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: About 19 to 21 degrees C

Human-transported materials: Variable material 0 to 50 cm thick used for land levelling and turf establishment

Clay content: 27 to 35 percent in the particle-size control section

Rock fragment content: 0 to 5 percent in most pedons

Reaction: Slightly alkaline or moderately alkaline

Calcium carbonate: In natural areas, soil is noncalcareous at the surface to a depth of up to 120 cm and is calcareous in the subsoil; the HTM may be calcareous at or near the surface; some pedons in natural areas are calcareous throughout

A or ^Au horizons:

Dry color—10YR 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR 2/1, 2/2, 3/1, 3/2, or 3/3
Texture—loam or clay loam
Note—some pedons have a transitional AB horizon with dark colors but do not have calcium carbonate

Bk, Btk, or Bt horizons:

Dry color—10YR 4/3, 5/2, 5/3, 6/3, or 6/4
Moist color—10YR 3/2, 3/3, 4/2, 4/3, 4/4, or 5/4
Texture—clay loam or loam; some pedons are stratified with coarse textures below a depth of 150 cm

Figure 67.—Location of representative profile of the Stukel family in the Angeles National Forest.

Note—some pedons have a Bt horizon in the subsurface where calcium carbonate masses are absent

Stukel Family

The Stukel family consists of very shallow or shallow, somewhat excessively drained soils that formed in material weathered from granitic or gneissic rocks. These soils are on mountainsides. Slopes range from 60 to 90 percent. Elevation ranges from 400 to 1,830 meters. Annual precipitation ranges from 530 to 860 millimeters.

Taxonomic Classification

Loamy, mixed, superactive, mesic Aridic Lithic Haploxerolls

Typical Pedon (fig. 67)

Stukel family gravelly loam in an area of Tollhouse-Stukel-Wrentham families complex, 60 to 90 percent slopes; Los Angeles County, California; in the Brown Mountain area, near the end of Forest Road 2N66, about 500 feet northwest of the water tank; 34 degrees 14 minutes 32.57 seconds N. latitude and 118 degrees 10 minutes 7.58 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Pasadena, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 10 centimeters; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; very friable, soft, nonsticky, nonplastic; many fine and many very fine roots; many fine and many very fine interstitial pores; 20 percent nonflat subangular indurated 2- to 76-millimeter granitoid fragments; slightly acid, pH 6.5; abrupt smooth boundary.

A2—10 to 28 centimeters; yellowish brown (10YR 5/4) gravelly sandy loam, dark brown (10YR 3/3) moist; very friable, soft, nonsticky, nonplastic; common fine and

common very fine roots; many fine and many very fine interstitial pores; 30 percent nonflat subangular indurated 2- to 76-millimeter granitoid fragments; moderately acid, pH 6.0; abrupt smooth boundary.

R—28 to 53 centimeters; fractured granitoid bedrock; few roots in cracks.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Soil temperature: 13 to 18 degrees C at the lithic contact

Depth to lithic contact: 50 to 117 cm

A horizons:

Dry color—10YR 5/4, 5/3, 5/2, 4/4, 4/3, 4/2, 3/3, or 3/2 or 2.5Y 5/2

Moist color—10YR 3/3, 3/2, or 2/2 or 2.5Y 3/2

Texture—loam, gravelly loam, cobbly loam, coarse sandy loam, or gravelly sandy loam

Rock fragments—0 to 30 percent; mostly gravel

Reaction—slightly acid or neutral (pH 6.1 to 7.3)

Note—some pedons have a thin Bw horizon or C horizon between the A horizon and bedrock

Thums Series

The Thums series consists of very deep, well drained soils that formed in uplifted alluvium from mixed rock sources and have a thin mantle of human-transported materials at the surface. These soils are on terraces and fan remnants. Slopes range from 0 to 5 percent. The mean annual precipitation is about 331 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine, smectitic, thermic Calcic Pachic Argixerolls

Typical Pedon (fig. 68)

Thums clay loam in an area of Urban land-Thums-Windfetch complex, 0 to 5 percent slopes; Los Angeles County, California; Los Altos Park in Long Beach; 33 degrees 47 minutes 1 second N. latitude and 118 degrees 7 minutes 54 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Long Beach, California. (Colors are for dry soil unless otherwise noted.)

^Au—0 to 6 centimeters; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; many medium distinct brown (10YR 4/3) mottles; strong coarse granular structure; slightly hard, friable, moderately sticky, moderately plastic; many very fine and many fine roots; few fine and medium artifacts; neutral, pH 7.0; abrupt smooth boundary.

^Cu—6 to 26 centimeters; brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; many medium distinct brown (10YR 4/3) mottles; strong medium subangular blocky structure; very hard, friable, very sticky, very plastic; common coarse and common medium roots; few fine and medium artifacts; common discontinuous clay films; finely disseminated carbonate and common fine distinct

Figure 68.—Representative profile of the Thums series. Photo taken at the southern boundary of Ken Malloy Harbor Regional Park, on the terrace. Scale is in centimeters.

irregular carbonate masses in matrix; soil structure, carbonates, and clay films are remnants of the source material; slightly effervescent; slightly alkaline, pH 7.4; clear wavy boundary.

2Btk1—26 to 95 centimeters; brown (10YR 4/3) clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, friable, very sticky, very plastic; common fine roots; many distinct clay films on faces of peds; common medium carbonate masses in matrix; slightly effervescent; moderately alkaline, pH 8.2; clear broken boundary.

2Btk2—95 to 115 centimeters; brownish yellow (10YR 6/6) silty clay, dark yellowish brown (10YR 4/4) moist; moderately hard, firm, moderately sticky, moderately plastic; many distinct clay films on faces of peds; finely disseminated carbonate

and common medium carbonate masses in matrix; strongly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

2Btn—115 to 170 centimeters; brownish yellow (10YR 6/6) silty clay loam, dark yellowish brown (10YR 4/4) moist; slightly hard, firm, moderately sticky, moderately plastic; many distinct clay films on faces of peds; common very fine distinct salt masses; slightly alkaline, pH 7.6.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May; soil is dry the remainder of the year, except in areas under continuous irrigation

Mean annual soil temperature: 18 to 21 degrees C

Rock fragment content: 0 to 5 percent, by volume

Calcium carbonate equivalency: 1 to 10 percent

Reaction: Neutral to moderately alkaline

Calcium carbonate: Finely disseminated calcium carbonate and/or soft masses of calcium carbonate

Depth to top of argillic horizon: 15 to 45 cm

Clay content: Average of 35 to 48 percent in the particle-size control section

^A, ^Au, or A horizon:

Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/1, 2/2, 3/1, 3/2, or 3/3
Texture—clay loam, loam, or sandy loam
Clay content—14 to 35 percent
Rock fragments—0 to 5 percent gravel
Artifacts—0 to 5 percent innocuous trash (such as plastic, brick, and glass)

^C or ^Cu horizon:

Dry color—10YR 3/2, 3/3, 4/2, 4/3, 4/4, 5/4, or 6/3
Moist color—10YR 2/2, 3/2, 3/3, 4/2, or 4/3
Texture—clay loam, loam, silty clay loam, or sandy loam
Clay content—18 to 40 percent
Rock fragments—0 to 15 percent from off-site sources
Artifacts—0 to 10 percent innocuous trash (such as plastic, brick, and glass)

2Bt, Btk, 2Btk, or 2Btn horizons:

Dry color—10YR or 2.5Y 4/3, 4/4, 5/3, 5/4, 6/3, or 6/6
Moist color—10YR or 2.5Y 3/2, 3/3, 4/3, 4/4, or 5/4
Texture—clay loam or clay in upper part of horizon; silty clay loam, silty clay, clay loam, or loam in lower part
Clay content—30 to 48 percent in upper part of horizon; 18 to 38 percent in lower part
Sodicity—SAR of 3 to 10 in upper part of horizon and 10 to 25 in lower part; some pedons have salt accumulations in the lower Bt horizon

Tollhouse Family

The Tollhouse family consists of very shallow or shallow, somewhat excessively drained soils that formed in material weathered from granitoid or gneissic rocks. These soils are on mountainsides and ridges. Elevation ranges from 402 to 1,830 meters. Slopes range from 60 to 90 percent. Annual precipitation is 530 to 860 millimeters.

Taxonomic Classification

Loamy, mixed, superactive, mesic, shallow Entic Haploxerolls

Figure 69.—Location of representative profile of the Tollhouse family in the Angeles National Forest.

Typical Pedon (fig. 69)

Tollhouse family gravelly sandy loam in an area of Tollhouse-Stukel-Wrentham families complex, 60 to 90 percent slopes; Los Angeles County, California; above Upper Shake Campground (closed), about 0.2 mile southeast, along trail; 34 degrees 41 minutes 20.93 seconds N. latitude and 118 degrees 31 minutes 37.32 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Burnt Peak, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 15 centimeters; grayish brown (10YR 5/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; moderate very fine and moderate fine granular structure; friable, soft, nonsticky, nonplastic; many medium roots; many very fine interstitial pores; 30 percent nonflat subangular indurated 2- to 76-millimeter granitoid fragments; neutral, pH 7.0; clear smooth boundary.

Cr—15 to 40 centimeters; moderately cemented granitoid bedrock.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Soil temperature: 8 to 15 degrees C at the paralithic contact

Depth to paralithic contact: 15 to 46 cm

Rock fragments: 5 to 30 percent small pebbles

A horizon:

Dry color—10YR 5/3, 5/2, 1/2, 4/1, or 3/2 or 2.5Y 5/2

Moist color—10YR 3/3, 3/2, 3/1, 2/2, or 2/1 or 2.5Y 3/2
Texture—loam, fine sandy loam, sandy loam, or gravelly sandy loam
Reaction—slightly acid to mildly alkaline (pH 6.1 to 7.8)
Note—in most pedons, horizon rests directly on the weathered rock; in others, a thin C horizon lies between them

C horizon (if it occurs):
Dry color—10YR 7/2, 6/3, or 6/2 or 2.5Y 7/2 or 6/2
Moist color—10YR 4/5 or 4/3 or 2.5Y 4/4 or 4/2
Texture—loam, gravelly sandy loam, or gravelly loamy sand
Reaction—neutral or mildly alkaline (pH 6.6 to 7.8)

Topanga Series

The Topanga series consists of well drained soils that are shallow to fractured bedrock and that formed in residuum and colluvium derived from bedded shale and sandstone. These soils are on hills and mountains. Slopes range from 20 to 75 percent. The mean annual precipitation is about 550 millimeters, and the mean annual air temperature is about 17.8 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, thermic, shallow Typic Argixerolls

Typical Pedon

Topanga gravelly loam in an area of Mipolomol-Topanga association, 30 to 75 percent slopes; Ventura County, California; about 1,600 meters north of the junction of Highways 1 and 23, about 230 meters south and 3 meters west of the northwest corner of section 29, T. 1 S., R. 21 W.; 34 degrees 3 minutes 26 seconds N. latitude and 118 degrees 53 minutes 38 seconds W. longitude, NAD 27 – U.S.G.S. Quad: Triunfo Pass, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 5 centimeters; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine to medium roots; few fine interstitial pores; 25 percent fine and medium subangular gravel; 10 percent fine subangular pararock fragments; slightly acid, pH 6.5; clear wavy boundary.
A2—5 to 38 centimeters; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine to medium roots; few fine interstitial pores; 20 percent fine and medium subangular gravel; 10 percent fine subangular pararock fragments; slightly acid, pH 6.5; clear wavy boundary.
Bt—38 to 45 centimeters; yellowish brown (10YR 5/4) gravelly clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, plastic; common very fine to medium roots; few fine tubular pores; 20 percent fine and medium subangular gravel; 10 percent fine subangular pararock fragments; slightly acid, pH 6.5; abrupt wavy boundary.
Cr—45 to 75 centimeters; highly fractured, bedded shale; fractures 1 to 3 inches apart; about 10 to 15 percent soil in fractures with few very fine roots.

Range in Characteristics

Soil moisture: Soil is moist from mid or late November to late May
Mean annual soil temperature: 18 to 21 degrees C
Depth to paralithic contact: 25 to 50 cm

Figure 70.—An area of Topdeck soil at Forrestal Nature Reserve on the Palos Verdes Peninsula.

Reaction: Neutral or slightly acid
Organic matter content: 2 to 4 percent

A horizons:
Dry color—10YR 5/2, 5/3, 4/2, or 4/3
Moist color—10YR 3/2 or 3/3
Clay content—12 to 27 percent
Rock fragment content—15 to 30 percent

Bt horizon:
Dry color—10YR 5/2, 5/3, or 5/4
Moist color—10YR 3/2, 3/3, 3/4, 4/3, or 4/4
Texture—loam, gravelly loam, gravelly clay loam, or clay loam
Clay content—18 to 35 percent
Rock fragment content—10 to 30 percent

Topdeck Series

The Topdeck series consists of shallow, well drained soils that formed in colluvium and residuum from basalt, breccia, and andesite. These soils are on marine terraces and side slopes of hills and mountains (fig. 70). Slopes range from 20 to 55 percent. The mean annual precipitation is about 360 millimeters, and the mean annual temperature is about 17.2 degrees C.

Taxonomic Classification

Loamy, mixed, superactive, thermic Lithic Argixerolls

Figure 71.—Representative profile of the Topdeck series. Scale is in centimeters.

Typical Pedon (fig. 71)

Topdeck loam in an area of Mollic Haploxeralfs, coastal-Topdeck-Urban land complex, 20 to 55 percent slopes; Los Angeles County, California; on the spur ridge crest on a backslope of a side slope; 33 degrees 44 minutes 29.97 seconds N. latitude and 118 degrees 20 minutes 51.49 seconds W. longitude, WGS 84 – U.S.G.S. Quad: San Pedro, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 8 centimeters; brown (7.5YR 5/3) loam, dark brown (7.5YR 3/3) moist; weak medium subangular blocky structure; common fine tubular and common very fine irregular pores; 2 percent angular 2- to 5-millimeter and 3 percent angular 6- to 75-millimeter calcareous shale fragments; moderately alkaline, pH 8.0; clear wavy boundary.

Btk—8 to 30 centimeters; brown (7.5YR 5/3) gravelly clay loam, dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure; common medium

tubular and common very fine irregular pores; clay films on all faces of peds; 3 percent medium prominent irregular white (10YR 8/1) carbonate masses in matrix; 3 percent angular 2- to 5-millimeter and 12 percent angular 6- to 75-millimeter calcareous shale fragments; moderately alkaline, pH 8.0; abrupt wavy boundary.

R—30 to 55 centimeters; indurated volcanic bedrock.

Range in Characteristics

Soil moisture: Soil becomes moist some time between October and December and remains moist until April or May
Mean annual temperature: 17 to 20 degrees C
Depth to lithic contact: 25 to 50 cm
Organic matter content: 1 to 3 percent
Rock fragment content: 5 to 25 percent

A horizon:
Dry color—7.5YR 5/2 or 5/3
Moist color—7.5YR 2.5/2, 3/2, or 3/3
Texture—loam
Clay content—18 to 25 percent

Btk or Bt horizon:
Dry color—7.5YR 5/3, 5/4, or 6/4
Moist color—7.5YR 3/3, 3/4, 4/3, or 4/4
Texture—clay loam or loam
Clay content—21 to 30 percent
Calcium carbonate—horizon may have few or common calcium carbonate masses

Trigo Family

The Trigo family consists of very shallow or shallow, somewhat excessively drained soils that formed in material weathered from granitic, metamorphic, or sedimentary rocks. These soils are on mountainsides and ridges. Elevation ranges from 410 to 1,002 meters. Slopes range from 15 to 100 percent. Annual precipitation ranges from 370 to 970 millimeters.

Taxonomic Classification

Loamy, mixed, nonacid, thermic, shallow Typic Xerorthents

Typical Pedon (fig. 72)

Trigo family silt loam in an area of Trigo-Calleguas families-Haploxeralfs complex, 30 to 70 percent slopes; Los Angeles County, California (soil survey of Angeles National Forest); road cut on the Old Ridge Route (Forest Road 8N04), about 0.5 mile south of Reservoir Hill; 34 degrees 39 minutes 17.33 seconds N. latitude and 118 degrees 43 minutes 11.39 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Liebre Mountain, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 20 centimeters; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak very fine and weak fine granular structure; friable, slightly hard, slightly sticky, moderately plastic; common very fine roots; many very fine tubular and many very fine interstitial pores; 7 percent nonflat subangular indurated 2- to 76-millimeter sandstone fragments; neutral, pH 7.0; clear smooth boundary.

C—20 to 41 centimeters; light yellowish brown (10YR 6/4) gravelly silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and weak medium subangular blocky structure; friable, hard, slightly sticky, slightly plastic; common medium roots; common very fine tubular and common very fine interstitial pores; 15 percent

Figure 72.—Location of representative profile of the Trigo family in the Angeles National Forest.

nonflat subangular indurated 2- to 76-millimeter sandstone fragments; neutral, pH 6.7; abrupt smooth boundary.

Cr—41 to 66 centimeters; moderately cemented sandstone.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest. The typical pedon is outside the boundary of the soil survey for Los Angeles County, Southeastern Part.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May; soil from a depth of about 4 inches to the paralithic contact is dry 6 out of 8 months between April and November or 8 months in areas mapped as a dry phase

Depth to paralithic contact: 3 to 20 inches

Reaction: Moderately acid to mildly alkaline (pH 5.6 to 7.8)

Rock fragment content: 0 to 30 percent

Parent material: Weathered sandstone or granitoid rock

A horizon:

Dry color—10YR 6/3, 6/2, 5/3, 5/2, 4/3, or 4/2; 2.5Y 6/4 or 5/4; or 7.5YR 4/4

Moist color—10YR 4/4, 3/4, 3/2, or 2/2; 2.5Y 4/4; or 7.5YR 4/4

Texture—loam, gravelly loam, sandy loam, fine sandy loam, gravelly sandy loam, silt loam, or gravelly silt loam

Note—in some pedons horizon rests directly on the paralithic contact

C horizon:

Dry color—10YR 7/4, 6/4, 6/3, or 5/4; 2.5Y 7/4 or 6/3; or 5Y 5/4

Moist color—10YR 5/4, 4/4, or 4/3; 2.5Y 4/4; 7.5YR 4/4; or 5Y 4/4
Texture—gravelly loam, sandy loam, fine sandy loam, gravelly sandy loam, or sandy clay loam
Note—horizon grades to highly weathered rock

Tujunga Series

The Tujunga series consists of very deep, somewhat excessively drained soils that formed in a thin layer of human-transported materials overlying alluvium from granitic sources. These soils are on alluvial fans and flood plains, including urban areas. Slopes range from 0 to 12 percent. The mean annual precipitation is about 450 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Mixed, thermic Typic Xeropsamments

Typical Pedon (fig. 73)

Tujunga loam in an area of Urban land-Tujunga-Typic Xerorthents, sandy substratum complex, 0 to 2 percent slopes; Los Angeles County, California; Valley Village Park, 15 meters east of road near the intersection at Morrison Drive, near two sycamore trees; 34 degrees 9 minutes 38 seconds N. latitude and 118 degrees 22 minutes 56 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Van Nuys, California. When described, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

^A—0 to 4 centimeters; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine interstitial pores; neutral, pH 6.6; clear wavy boundary.
^C1—4 to 21 centimeters; pale brown (10YR 6/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; common very fine and common very coarse roots; common very fine and common medium tubular pores; 1 percent subrounded granitoid gravel; moderately alkaline, pH 7.9; clear smooth boundary.
2C2—21 to 70 centimeters; pale brown (10YR 6/3) coarse sand, brown (10YR 5/3) moist; single grain; loose, loose, nonsticky, nonplastic; common very fine roots; 2 percent subrounded granitoid cobbles and 9 percent subrounded gravel; slightly alkaline, pH 7.7; clear smooth boundary.
2C3—70 to 125 centimeters; pale brown (10YR 6/3) sand, brown (10YR 5/3) moist; single grain; loose, loose, nonsticky, nonplastic; common very fine roots; 2 percent subrounded granitoid cobbles and 3 percent granitic fine gravel; slightly alkaline, pH 7.4; clear wavy boundary.
2C4—125 to 200 centimeters; brown (10YR 5/3) loamy fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose, loose, nonsticky, nonplastic; slightly alkaline, pH 7.4.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 to 90 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C
Texture in the particle-size control section: Coarse sand, sand, loamy sand, fine sand, or loamy fine sandy or the gravelly analogs of these textures; thin strata with silt-sized particles are lacking
Sand content: More than 35 percent combined medium to very coarse sand in the control section

Figure 73.—Representative profile of the Tujunga series. Scale is in centimeters.

Rock fragment content: Dominantly 0 to 5 percent throughout the profile; individual horizons may have up to 35 percent
Reaction: Slightly acid to moderately alkaline
Thickness of human-transported materials (if they occur): Less than 50 cm

A horizon:
Dry color—10YR 4/3, 5/3, 6/2, or 6/3
Moist color—10YR 3/2, 3/3, 4/2, 4/3, or 5/3
Texture—fine sand, sand, loamy sand, or loamy fine sand; sandy loam or fine sandy loam may occur in pedons with surficial anthropogenic modification; gravelly textures in some pedons
Artifacts—0 to 10 percent construction debris

C horizons:
Dry color—10YR 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, 6/6, 7/3, 7/4, 8/3, or 8/4
Moist color—10YR 4/2, 4/3, 4/4, 5/3, 5/4, 6/3, or 6/4

Figure 74.—Typical landscape of Typic Fluvaquents. Photo taken at Los Cerritos Wetlands.

Texture—coarse sand, sand, fine sand, loamy sand, or loamy fine sand that is commonly stratified or has a gravelly texture modifier
Artifacts—0 to 10 percent in horizons with human-transported materials

Typic Fluvaquents

Typic Fluvaquents consist of very deep, very poorly drained soils that formed in mixed alluvium of drained tidal marshes. These soils are on shore complexes in drained marshlands (fig. 74). Slopes range from 0 to 2 percent. The mean annual precipitation is about 340 millimeters, and the mean annual temperature is about 17 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, nonacid, thermic Typic Fluvaquents

Typical Pedon

Typic Fluvaquents in an area of Bolsa, drained-Typic Xerorthents, dredged spoil-Typic Fluvaquents complex, 0 to 2 percent slopes; Los Angeles County, California; City of Long Beach, 500 meters east and 370 meters south of the intersection of Studebaker Road and Westminster Avenue; 33 degrees 45 minutes 23.00 seconds N. latitude and 118 degrees 5 minutes 57.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Los Alamitos, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 30 centimeters; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; strong thick platy structure; firm, moderately hard, very sticky, very plastic; common fine and common medium pores; 2 percent medium manganese coatings and 5 percent masses of oxidized iron lining pores; few lenses of very fine sand; slightly effervescent; neutral, pH 7.3; abrupt broken boundary.

Cg1—30 to 65 centimeters; loamy very fine sand, dark gray (5Y 4/1) moist; massive; very friable, soft, nonsticky, nonplastic; 2 percent coarse and 3 percent medium masses of oxidized iron; slightly effervescent; neutral, pH 7.2; clear smooth boundary.

Cg2—65 to 200 centimeters; silt loam, black (N 2.5) moist; massive; firm, hard, moderately sticky, very plastic; 1 percent very coarse masses of oxidized iron and 2 percent coarse masses of oxidized iron; slightly effervescent; neutral, pH 7.3.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 17 to 20 degrees C

Human-transported materials: Material occurs sporadically at the surface and generally does not significantly differ from the native material or, if it is finer in texture, is typically a thin layer (less than 50 cm thick)

Depth to aquic conditions: 0 to 65 cm (soil is drained)

Reaction: Neutral to moderately alkaline

Calcium carbonate: Disseminated calcium carbonate throughout the profile; some pedons do not have carbonates in the upper 90 cm

A horizon:

Dry color—hue of 2.5Y or 10YR, value of 4 to 7, and chroma of 2 or 3
Moist color—hue of 2.5Y or 10YR, value of 3 or 4, and chroma of 2 or 3
Texture—silt loam or loam

Cg horizons:

Moist color—horizon has hue of 5Y to 10YR or is neutral in hue, has value of 4 to 5, and has chroma of 1 to 3
Texture—stratified layers of sand, loamy sand, and silt loam

Typic Haploxeralfs

Typic Haploxeralfs consist of very deep, well drained soils that formed in a thin discontinuous layer of human-transported materials over mixed alluvium. These soils are on uplifted terraces. Slopes range from 0 to 15 percent. The mean annual precipitation is about 341 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Typic Haploxeralfs

Typical Pedon

Typic Haploxeralfs in an area of Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 0 to 5 percent slopes; Los Angeles County, California; Lomita Park, 165 meters east and 50 meters south of the intersection of Eshelman Avenue and Lomita Park Place; 33 degrees 48 minutes 11.62 seconds N. latitude and 118 degrees 18 minutes 46.32 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Torrance, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 15 centimeters; pale brown (10YR 6/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; very friable, slightly hard, nonsticky, nonplastic; neutral, pH 6.8; clear wavy boundary.
^Au—15 to 25 centimeters; pale brown (10YR 6/3) loamy fine sand, very dark grayish brown (10YR 3/2) moist; very friable, soft, nonsticky, nonplastic; 5 percent nonflat rounded indurated 2- to 75-millimeter mixed rock fragments, 1 percent irregular 2- to 75-millimeter concrete fragments, and 2 percent irregular 2- to 75-millimeter plastic fragments; neutral, pH 6.8; clear wavy boundary.
2AB—25 to 75 centimeters; light yellowish brown (10YR 6/4) loamy fine sand, dark yellowish brown (10YR 3/4) moist; very friable, soft, nonsticky, nonplastic; neutral, pH 7.0; clear wavy boundary.
2Bt1—75 to 100 centimeters; very pale brown (10YR 7/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; friable, slightly hard, slightly sticky, slightly plastic; distinct clay films on all faces of peds; slightly alkaline, pH 7.4; gradual wavy boundary.
2Bt2—100 to 140 centimeters; very pale brown (10YR 7/4) fine sandy loam, yellowish brown (10YR 5/4) moist; very friable, slightly hard, nonsticky, nonplastic; distinct clay films on all faces of peds; 1 percent medium distinct irregular extremely weakly cemented yellowish brown (10YR 5/8) and 3 percent medium prominent irregular weakly cemented black (N 2/) relict iron-manganese concretions with sharp boundaries in matrix; slightly alkaline, pH 7.4; gradual wavy boundary.
2BC—140 to 160 centimeters; very pale brown (10YR 7/4) fine sandy loam, light yellowish brown (10YR 6/4) moist; very friable, slightly hard, nonsticky, nonplastic; 10 percent coarse prominent irregular yellowish brown (10YR 5/8) relict iron-manganese masses with sharp boundaries in matrix; 5 percent medium clay bodies in matrix; slightly alkaline, pH 7.4.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C
Redoximorphic features: Relict masses and weakly cemented concretions; features do not represent current saturation
Reaction: Neutral to moderately alkaline throughout the profile

^A or ^Au horizon:
Dry color—10YR 4/2, 5/2, 5/3, or 6/3
Moist color—10YR 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—fine sandy loam, sandy loam, or loamy fine sand

Bt or 2Bt horizons:
Dry color—10YR 5/6, 6/3, 6/4, 6/6, 7/3, or 7/4
Moist color—10YR 4/4, 5/4, or 5/6
Texture—fine sandy loam or sandy loam; upper part is loamy fine sand in some pedons

BC, 2BC, or C horizon:
Dry color—10YR 6/3, 6/4, or 6/6
Moist color—10YR 4/4, 5/4, 5/6, 6/4, or 6/6
Texture—fine sandy loam or loamy fine sand

Typic Haploxerolls

Typic Haploxerolls consist of very deep, well drained soils that formed in mixed alluvium. These soils are on terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is about 341 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls

Typical Pedon

Typic Haploxerolls in an area of Urban land-Windfetch-Typic Haploxerolls complex, 0 to 2 percent slopes; Los Angeles County, California; Mas Fukai Park in Gardena, near right foul line of softball field; 33 degrees 53 minutes 10.02 seconds N. latitude and 118 degrees 18 minutes 1.97 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Inglewood, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 16 centimeters; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; friable, slightly sticky, nonplastic; common medium and very fine roots; common fine tubular pores; moderately alkaline, pH 8.0; clear wavy boundary.

A2—16 to 42 centimeters; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; very friable, slightly sticky, nonplastic; common medium roots; common fine and medium tubular pores; moderately alkaline, pH 8.0; clear wavy boundary.

C1—42 to 110 centimeters; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; very friable, slightly sticky, nonplastic; common very fine roots; common fine tubular pores; moderately alkaline, pH 8.0; gradual wavy boundary.

C2—110 to 170 centimeters; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; very friable, nonsticky, nonplastic; common fine tubular pores; few very faint variegations; moderately alkaline, pH 8.0.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Human-transported materials: Material sporadically occurs at the surface and generally does not significantly differ from the native material or, if it is finer in texture, is typically a thin layer (less than 50 cm thick)

Organic matter content: 1 to 3 percent in the upper 25 cm; decreasing to less than 1 percent within a depth of 50 cm

Reaction: Slightly alkaline or moderately alkaline throughout the profile

A horizons:
Dry color—10YR 4/2, 4/3, or 5/3
Moist color—10YR 3/1, 3/2, 3/3, or 2/2
Texture—loam, fine sandy loam, or sandy loam

C horizons:
Dry color—10YR 5/3, 5/4, 6/3, or 6/4

Moist color—10YR 3/3, 3/4, 4/3, 4/4, 5/3, or 5/4
Texture—fine sandy loam or sandy loam

Typic Xerorthents, Calcareous

Typic Xerorthents, calcareous are very deep, well drained soils that formed in human-transported materials. These soils are on cut-and-fill terraces. Slopes range from 0 to 5 percent. The mean annual precipitation is about 380 millimeters, and the mean annual temperature is about 17.5 degrees C.

Taxonomic Classification

Coarse-loamy, spolic, mixed, superactive, nonacid, thermic Typic Xerorthents

Typical Pedon

Typic Xerorthents, calcareous in an area of Urban land-Typic Xerorthents, calcareous complex, 0 to 5 percent slopes; Los Angeles County, California; Rancho Palos Verdes at Eastview Park; 33 degrees 45 minutes 39.98 seconds N. latitude and 118 degrees 18 minutes 34.51 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Torrance, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 8 centimeters; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; strong medium granular and strong coarse granular structure; friable, moderately hard, slightly sticky, slightly plastic; common fine and very fine roots; slightly alkaline, pH 7.5; abrupt smooth boundary.

^Cu—8 to 30 centimeters; grayish brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; firm, hard, moderately sticky, very plastic; common very fine roots; 4 percent nonflat subangular indurated 2- to 5-millimeter and 16 percent nonflat subangular indurated 5- to 75-millimeter mixed rock fragments; 2 percent irregular 2- to 75-millimeter brick fragments; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

^C1—30 to 65 centimeters; light yellowish brown (2.5Y 6/3) fine sandy loam, olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; very friable, moderately hard, nonsticky, nonplastic; few very fine roots; common very fine irregular pores; 5 percent medium distinct irregular weakly cemented white (10YR 8/1) carbonate concretions with clear boundaries in matrix; 4 percent nonflat subangular indurated 2- to 5-millimeter and 6 percent nonflat subangular indurated 5- to 75-millimeter mixed rock fragments; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

^C2—65 to 85 centimeters; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; very friable, moderately hard, moderately sticky, moderately plastic; few very fine roots; common very fine irregular pores; 5 percent faint clay films on all faces of peds; 1 percent fine distinct irregular very weakly cemented white (10YR 8/1), dry, carbonate concretions with clear boundaries in matrix; 1 percent nonflat subangular indurated 2- to 5-millimeter and 2 percent nonflat subangular indurated 5- to 75-millimeter mixed rock fragments; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

^C3—85 to 150 centimeters; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very friable, moderately hard, moderately sticky, moderately plastic; common very fine irregular pores; 10 percent distinct clay films on all faces of peds; 20 percent fine distinct threadlike white (10YR 8/1), dry, carbonate masses with clear boundaries in matrix; 1 percent nonflat subangular indurated 2- to 5-millimeter and 3 percent

nonflat subangular indurated 5- to 75-millimeter mixed rock fragments; violently effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 17 to 20 degrees C
Thickness of human-transported materials: More than 150 cm
Artifacts: 0 to 15 percent construction debris throughout the profile
Clay content: Average of less than 18 percent in the particle-size control section; typically higher at or near the surface

^A or ^Au horizon:
Dry color—10YR or 2.5Y 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR or 2.5Y 2/2, 3/2, 3/3, or 4/2
Texture—sandy loam, fine sandy loam, or loamy fine sand
Rock fragments—0 to 15 percent gravel

^C or ^Cu horizons:
Dry color—10YR or 2.5Y 5/2, 5/3, 5/4, 6/2, 6/3, or 7/3
Moist color—10YR or 2.5Y 3/3, 4/2, 4/3, 4/4, 5/3, 5/4, 6/2, or 6/3
Texture—fine sandy loam, loam, or silt loam
Rock fragments—0 to 35 percent gravel

Typic Xerorthents, Calcareous Substratum

Typic Xerorthents, calcareous substratum are very deep, well drained soils that formed in human-transported materials over calcareous alluvium weathered from calcareous sedimentary sources. These soils are on flood plains covered in clean fill. Slopes range from 0 to 5 percent. The mean annual precipitation is about 360 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Typic Xerorthents

Typical Pedon

Typic Xerorthents, calcareous substratum in an area of Urban land-Typic Xerorthents, calcareous substratum, 0 to 5 percent slopes; Los Angeles County, California; San Pedro District, City of Los Angeles, 15 meters east and 5 meters north of the intersection of Englander Street and Taper Avenue; 33 degrees 45 minutes 54.07 seconds N. latitude and 118 degrees 17 minutes 57.59 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Torrance, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 13 centimeters; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; friable, moderately hard, slightly sticky, slightly plastic; slightly effervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.
^C1—13 to 54 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; friable, extremely hard, slightly sticky, slightly plastic; clay films on all faces of peds; 2 percent angular 2- to 5-millimeter and 3 percent angular 6- to 75-millimeter mixed rock fragments; very dark brown (10YR 2/2) band at a depth of 30

centimeters; clay films are remnants of the source material; slightly effervescent; slightly alkaline, pH 7.4; mixed matrix color; clear wavy boundary.

^C2—54 to 90 centimeters; pale brown (10Yr 6/3) loam, brown (10YR 4/3) moist; friable, slightly sticky, slightly plastic; common distinct clay films; 2 percent angular 2- to 5-millimeter and 3 percent angular 6- to 75-millimeter mixed rock fragments; clay films are remnants of the source material; mixed matrix color; slightly effervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

^Cu—90 to 115 centimeters; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; friable, moderately sticky, slightly plastic; 2 percent medium faint irregular gray (10YR 5/1) iron depletions in matrix and 3 percent medium prominent irregular dark yellowish brown (10YR 4/6) iron-manganese masses in matrix; 2 percent angular 2- to 5-millimeter mixed rock fragments, 1 percent 2- to 75-millimeter brick fragments, and 1 percent 2- to 75-millimeter bitumen (asphalt) fragments; gravel is mechanically crushed; slightly effervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

2Bk—115 to 165 centimeters; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; friable, moderately sticky, moderately plastic; 2 percent medium prominent irregular white (10YR 8/1) carbonate masses in matrix; 3 percent angular 2- to 5-millimeter and 5 percent angular 6- to 75-millimeter mixed rock fragments; slightly effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and unpredictable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 20 degrees C
Thickness of human-transported materials: More than 100 cm
Depth to natural soil: 100 to 200 cm
Artifacts: 0 to 15 percent construction debris
Note: Natural soil has properties similar to the Sorrento series

^A or ^Au horizon:
Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/2, 3/1, 3/2, 3/3, 4/2, or 4/3
Texture—typically loam, but any texture is possible

^C or ^Cu horizon:
Dry color—10YR 5/3, 5/4, 6/3, or 6/4
Moist color—10YR 4/2, 4/3, 4/4, or 5/4
Texture—typically loam, but any texture is possible

2Bk horizon:
Dry color—10YR 5/3, 6/3, or 6/4
Moist color—10YR 3/4, 4/2, 4/3, or 4/4
Texture—loam or clay loam

Typic Xerorthents, Coarse

Typic Xerorthents, coarse are very deep, well drained soils that formed in human-transported materials on engineered terraces of steep granitic mountain slopes. Slopes range from 10 to 35 percent. The mean annual precipitation is about 530 millimeters, and the mean annual temperature is about 18.4 degrees C.

Taxonomic Classification

Sandy, spolic, mixed, thermic Typic Xerorthents

Typical Pedon

Typic Xerorthents, coarse in an area of Urban land-Typic Xerorthents, coarse-Vista complex, 10 to 35 percent slopes; Los Angeles County, California; City of Glendale, on the uppermost terrace at Montrose Park; 34 degrees 12 minutes 3.00 seconds N. latitude and 118 degrees 13 minutes 31.00 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Pasadena, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 7 centimeters; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; friable, slightly hard, slightly sticky, slightly plastic; common fine and medium and few very fine roots; common very fine tubular and common very fine interstitial pores; 1 percent 2- to 5-millimeter diorite fragments; slightly alkaline, pH 7.6; clear wavy boundary.

^Au—7 to 31 centimeters; light yellowish brown (2.5Y 6/4) fine sandy loam, olive brown (2.5Y 4/3) moist; 2 percent medium faint platy light olive brown (2.5Y 5/4) mottles; massive; friable, hard, slightly sticky, slightly plastic; few medium, fine, and very fine roots; many very fine interstitial pores; 2 percent 2- to 5-millimeter diorite fragments; 1 percent flat non-cohesive 20- to 75-millimeter glass fragments; slightly alkaline, pH 7.6; abrupt wavy boundary.

^C1—31 to 75 centimeters; light olive brown (2.5Y 5/4) gravelly sand, olive brown (2.5Y 4/4) moist; 2 percent clay; single grain; loose, loose, nonsticky, nonplastic; 1 percent 76- to 250-millimeter, 7 percent 2- to 5-millimeter, and 13 percent 6- to 75-millimeter diorite fragments; neutral, pH 7.2; gradual wavy boundary.

^C2—75 to 155 centimeters; light olive brown (2.5Y 5/4) gravelly sand, variegated olive brown (2.5Y 4/4 and 4/3) moist; 2 percent clay; single grain; loose, loose, nonsticky, nonplastic; 2 percent 76- to 250-millimeter, 3 percent 6- to 75-millimeter, and 17 percent 2- to 5-millimeter diorite fragments; neutral, pH 7.2.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Human-transported materials: More than 150 cm thick; pulverized granitic rock fragments from localized and excavated bedrock

^A horizons:
Dry color—10YR 4/2, 4/3, or 5/3
Moist color—10YR 3/2 or 3/3
Texture—sandy loam or fine sandy loam
Reaction—neutral or slightly alkaline

^C horizons:
Dry color—10YR or 2.5Y 5/3, 5/4, or 6/4
Moist color—10YR or 2.5Y 4/3 or 4/4
Texture—gravelly sand or sand
Rock fragment content—0 to 35 percent
Reaction—slightly acid to slightly alkaline

Typic Xerorthents, Coarse Substratum

Typic Xerorthents, coarse substratum consist of very deep, well drained soils that formed in human-transported materials. These soils are on uplifted alluvial terraces. Slopes range from 0 to 15 percent. The mean annual precipitation is about 341 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Coarse-loamy, spolic, mixed, superactive, nonacid, thermic Typic Xerorthents

Typical Pedon

Typic Xerorthents, coarse substratum in an area of Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 0 to 5 percent slopes; Los Angeles County, California; Wilmington Town Square Park; 33 degrees 46 minutes 52.01 seconds N. latitude 118 degrees 15 minutes 43.48 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Torrance, California. (Colors are for dry soil unless otherwise noted.)

^Au—0 to 14 centimeters; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; very friable, slightly hard, nonsticky, nonplastic; common very fine irregular pores; 1 percent 2- to 75-millimeter brick fragments; moderately alkaline, pH 8.0; clear wavy boundary.

^Cu—14 to 40 centimeters; pale brown (10YR 6/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; very friable, slightly hard, nonsticky, nonplastic; common very fine irregular pores; 1 percent nonflat subangular indurated 2- to 75-millimeter mixed rock fragments; 1 percent 2- to 75-millimeter brick and 2 percent 2- to 75-millimeter concrete fragments; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

^C—40 to 70 centimeters; brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 3/4) moist; massive; very friable, slightly hard, nonsticky, nonplastic; moderately alkaline, pH 8.0; abrupt wavy boundary.

2C1—70 to 155 centimeters; light yellowish brown (10YR 6/4) loamy fine sand, dark yellowish brown (10YR 4/4) moist; massive; loose, loose, nonsticky, nonplastic; moderately alkaline, pH 8.0; gradual wavy boundary.

2C2—155 to 165 centimeters; light yellowish brown (10YR 6/4) loamy fine sand, yellowish brown (10YR 5/4) moist; massive; loose, loose, nonsticky, nonplastic; moderately alkaline, pH 8.0.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 20 degrees C

A or ^Au horizon:

Dry color—10YR 4/2, 4/3, or 5/3
Moist color—10YR 2/2 or 3/2
Texture—fine sandy loam
Rock fragments—0 to 15 percent fine to medium gravel

^C or ^Cu horizon:

Dry color—10YR 5/3, 5/4, 6/3, or 6/4
Moist color—10YR 3/3, 3/4, 4/4, or 5/4

Texture—fine sandy loam, sandy loam, loamy fine sand, or loamy sand with pockets of material with higher clay content
Rock fragments—0 to 15 percent fine to medium gravel
Artifacts—0 to 10 percent gravel-sized construction debris

2C horizons:
Dry color—10YR 6/3 or 6/4
Moist color—10YR 4/3, 4/4, or 5/4
Texture—loamy fine sand or sandy loam
Note—some pedons have a weakly developed 2Bt horizon with weakly developed clay bridging and little to no clay increase

Typic Xerorthents, Dredged Spoil

Typic Xerorthents, dredged spoil consist of very deep, poorly drained soils that formed in human-transported materials (HTM) overlying mixed alluvium. These soils are on filled and drained wetlands. Slopes range from 0 to 2 percent. The mean annual precipitation is about 340 millimeters, and the mean annual temperature is about 17.2 degrees C.

Taxonomic Classification

Coarse-loamy, dredgic, mixed, superactive, nonacid, thermic Typic Xerorthents

Typical Pedon

Typic Xerorthents, dredged spoil in an area of Bolsa, drained-Typic Xerorthents, dredged spoil-Typic Fluvaquents complex, 0 to 2 percent slopes; Los Angeles County, California; City of Long Beach, 650 meters south and 310 meters east of the intersection of Westminster Avenue and Studebaker Road; 33 degrees 45 minutes 16.00 seconds N. latitude and 118 degrees 6 minutes 2.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Alamitos, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 7 centimeters; light brown (7.5YR 6/3) sand, brown (7.5YR 4/3) moist; single grain; loose, soft, nonsticky, nonplastic; 5 percent 5- to 75-millimeter and 8 percent 2- to 5-millimeter fragments; neutral, pH 6.8; abrupt smooth boundary.
^C1—7 to 10 centimeters; light yellowish brown (2.5Y 6/3) loamy sand, very dark grayish brown (2.5Y 3/2) moist; massive; loose, loose, nonsticky, nonplastic; neutral, pH 7.2; gradual smooth boundary.
^C2—10 to 15 centimeters; light yellowish brown (2.5Y 6/3) loamy sand, very dark grayish brown (2.5Y 3/2) moist; massive; loose, loose, nonsticky, nonplastic; neutral, pH 7.2; gradual smooth boundary.
^C3—15 to 30 centimeters; light yellowish brown (2.5Y 6/3) loamy sand, very dark grayish brown (2.5Y 3/2) moist; massive; loose, loose, nonsticky, nonplastic; slightly alkaline, pH 7.4; abrupt smooth boundary.
^Cu1—30 to 80 centimeters; light yellowish brown (2.5Y 6/3) sandy loam, variegated very dark grayish brown (2.5Y 3/2) moist; massive; loose, soft, nonsticky, slightly plastic; 5 percent discontinuous faint clay bridges; 1 percent 2- to 5-millimeter and 1 percent 5- to 75-millimeter mixed fragments; 5 percent irregular 2- to 75-millimeter bitumen (asphalt) fragments; slightly alkaline, pH 7.4; clear smooth boundary.
^Cu2—80 to 120 centimeters; yellowish brown (10YR 5/4) loamy sand, variegated dark brown (7.5YR 3/4) moist; single grain; loose, soft, nonsticky, nonplastic; 2 percent 2- to 75-millimeter metal fragments; neutral, pH 7.2; abrupt smooth boundary.

2C—120 to 200 centimeters; olive gray (5Y 5/2) silt loam, dark olive gray (5Y 3/2) moist; massive; very friable, slightly hard, moderately sticky, slightly plastic; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May; the landscape has been drained and a water table no longer occurs in the profile
Mean annual soil temperature: 17 to 20 degrees C
Thickness of human-transported materials: More than 100 cm
Artifacts: 0 to 15 percent construction debris in the HTM

^A or ^Au horizon:
Dry color—10YR or 7.5YR 5/3 or 6/3
Moist color—10YR or 7.5YR 3/2, 3/3, or 4/3
Texture—loamy sand, sand, or sandy loam

^C or ^Cu horizons:
Dry color—10YR or 7.5YR 5/3, 5/4, 6/3, or 7/3
Moist color—10YR or 7.5YR 3/2, 3/3, 3/4, 4/2, or 4/3
Texture—sandy loam, loamy sand, or sand

2C horizon:
Dry color—5Y to 10YR 5/2, 6/2, or 6/3
Moist color—5Y to 10YR 3/2, 4/2, 4/3, or 5/3
Texture—silt loam or loam

Typic Xerorthents, Fine Substratum

Typic Xerorthents, fine substratum consist of very deep, well drained soils that formed in human-transported materials (HTM) overlying alluvium weathered from mixed sedimentary and granitic sources. These soils are in graded and filled areas of alluvial fans, low-lying terraces, and flood plains. The mean annual precipitation is about 395 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Fine-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents

Typical Pedon

Typic Xerorthents, fine substratum in an area of Urban land-Ballona-Typic Xerorthents, fine substratum complex, 0 to 5 percent slopes; Los Angeles County, California; Robertson Recreation Center, in center of lawn area between basketball court and Robertson Boulevard, 50 feet north of Airdrome Street, 50 feet east of Robertson Boulevard; 34 degrees 2 minutes 56.43 seconds N. latitude and 118 degrees 23 minutes 6.40 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Beverly Hills, California. (Colors are for dry soil unless otherwise noted.)

^Au—0 to 32 centimeters; pale brown (10YR 6/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure and massive; friable, moderately hard, moderately sticky, moderately plastic; common fine roots; common very fine irregular pores; finely disseminated carbonate; 1 percent irregular brick, 2 percent

irregular concrete, and 2 percent irregular bitumen (asphalt) 2- to 75-millimeter fragments; strongly effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

^Cu1—32 to 95 centimeters; pale brown (10YR 6/3) clay loam, dark brown (10YR 3/3) moist; massive; friable, very hard, moderately sticky, moderately plastic; few very fine roots; few very fine irregular pores; finely disseminated carbonate; 10 percent indurated 2- to 75-millimeter mixed rock fragments; 2 percent irregular brick, 2 percent irregular bitumen (asphalt), and 4 percent irregular concrete 2- to 75-millimeter fragments; strongly effervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

^Cu2—95 to 120 centimeters; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; massive; friable, very hard, very sticky, moderately plastic; few very fine irregular pores; finely disseminated carbonate; 5 percent subrounded indurated 2- to 75-millimeter mixed rock fragments; 1 percent irregular brick, 2 percent irregular concrete, and 2 percent irregular bitumen (asphalt) 2- to 75-millimeter fragments; strongly effervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

2C1—120 to 145 centimeters; brown (10YR 5/3) clay, dark yellowish brown (10YR 3/4) moist; massive; firm, very hard, very sticky, very plastic; few very fine irregular pores; 5 percent subrounded indurated 2- to 75-millimeter mixed rock fragments; slightly alkaline, pH 7.4; gradual wavy boundary.

2C2—145 to 200 centimeters; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; massive; firm, very hard, very sticky, very plastic; few very fine irregular pores; 5 percent subrounded indurated 2- to 75-millimeter mixed rock fragments; slightly alkaline, pH 7.4.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Thickness of human-transported materials: More than 100 cm

Calcium carbonate: Finely disseminated carbonate with few or no carbonate masses in the HTM; some pedons have few or common carbonate masses in the natural subsoil

^A or ^Au horizon:

Dry color—10YR 4/2, 4/3, 5/3, or 6/3
Moist color—10YR 2/2, 3/1, 3/2, or 3/3
Texture—loam or clay loam
Rock fragment content—0 to 15 percent
Artifacts—0 to 10 percent construction debris

^C or ^Cu horizons:

Dry color—10YR 4/2, 4/3, 5/3, or 6/3
Moist color—10YR 3/2, 3/3, or 4/3
Texture—clay loam or clay
Rock fragment content—0 to 15 percent
Artifacts—0 to 10 percent construction debris

2C horizons:

Dry color—10YR 4/2, 4/3, or 5/3
Moist color—10YR 3/3, 3/4, or 4/3

Texture—clay or clay loam
Rock fragment content—0 to 5 percent
Clay content—30 to 50 percent

Typic Xerorthents, Sandy Substratum

Typic Xerorthents, sandy substratum consist of very deep, well drained soils that formed in human-transported materials (HTM) overlying sandy alluvium from granitic sources. These soils are on flood plains in areas with filled surfaces. Slopes range from 0 to 5 percent. The mean annual precipitation is about 451 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Coarse-loamy, spolic, mixed, superactive, nonacid, thermic Typic Xerorthents

Typical Pedon

Typic Xerorthents, sandy substratum in an area of Urban land-Tujunga-Typic Xerorthents, sandy substratum complex, 0 to 2 percent slopes; Los Angeles County, California; Atwater Village District of Los Angeles, 150 meters south and 100 meters west of the intersection of Chevy Chase Drive and Verdant Street; 34 degrees 7 minutes 55.28 seconds N. latitude and 118 degrees 16 minutes 19.66 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Burbank, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 16 centimeters; pale brown (10YR 6/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; friable, moderately sticky, moderately plastic; moderately alkaline, pH 8.0; abrupt smooth boundary.

^Cu1—16 to 45 centimeters; light yellowish brown (2.5Y 6/3) sandy loam and clay loam, light yellowish brown (2.5Y 6/4) and dark grayish brown (2.5Y 4/2) moist; massive; friable, slightly sticky, slightly plastic; 3 percent medium prominent irregular white (10YR 8/1) carbonate masses in matrix; 1 percent irregular concrete and 2 percent irregular bitumen (asphalt) 2- to 75-millimeter fragments; carbonate masses are remnants of the source material and matrix color is mechanically mixed; moderately alkaline, pH 8.0; clear wavy boundary.

^Cu2—45 to 95 centimeters; pale brown (10YR 6/3) and very pale brown (10YR 7/4) sandy loam, dark yellowish brown (10YR 4/6), dark grayish brown (10YR 4/2), and dark yellowish brown (10YR 4/4) moist; massive; friable, slightly sticky, slightly plastic; 3 percent medium prominent irregular white (10YR 8/1) carbonate masses in matrix; 1 percent irregular concrete, 1 percent irregular brick, and 8 percent irregular bitumen (asphalt) 2- to 75-millimeter fragments; calcium carbonate masses are remnants of the source material and matrix color is mechanically mixed; moderately alkaline, pH 8.0; clear wavy boundary.

2C—95 to 200 centimeters; very pale brown (10YR 7/3) sand, brown (10YR 4/3) moist; single grain; loose, loose, nonsticky, nonplastic; 5 percent rounded indurated 2- to 75-millimeter mixed rock fragments; slightly alkaline, pH 7.4.

Range in Characteristics

Note: These soils are mapped at the subroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C

Human-transported materials: More than 75 cm thick; finer textures are at or near the surface and coarser textures are in the subsurface
Artifacts: 0 to 15 percent in the HTM
Reaction: Slightly alkaline or moderately alkaline in the HTM and neutral or slightly alkaline in the natural subsoil

^A or ^Au horizon:
Dry color—2.5Y or 10YR 5/3, 5/4, or 6/3
Moist color—2.5Y or 10YR 3/2, 3/3, 4/2, or 4/3
Texture—sandy loam, loam, or clay loam, with finer textured HTM near the surface

^C or ^Cu horizons:
Dry color—2.5Y or 10YR 5/3, 5/4, 6/3, 6/4, or 7/3
Moist color—2.5Y or 10YR 4/2, 4/3, 4/4, 5/3, 5/4, 6/3, or 6/4
Texture—sandy loam, loam, or clay loam in upper part of horizon; sand or loamy sand from locally transported sources in lower part

2C horizon:
Dry color—2.5Y or 10YR 6/3, 6/4, 7/3, or 7/4
Moist color—2.5Y or 10YR 4/3, 4/4, 5/3, or 5/4
Texture—sand or loamy sand
Rock fragment content—0 to 20 percent; content gradually increasing the nearer the pedon to the mountains

Typic Xerorthents, Terraced

Typic Xerorthents, terraced consist of well drained soils that formed in human-transported materials on engineered hillslope terraces. These soils are on hills and foothills. Slopes range from 2 to 35 percent slopes. The mean annual precipitation is about 398 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Typic Xerorthents

Typical Pedon

Typic Xerorthents, terraced in an area of Urban land-Typic Xerorthents, terraced complex, 10 to 35 percent slopes; Los Angeles County, California; Baldwin Hills area, on an engineered terrace at Norman O. Houston Park; 33 degrees 59 minutes 55.04 seconds N. latitude and 118 degrees 21 minutes 26.78 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Beverly Hills, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 8 centimeters; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; very friable, slightly hard, nonsticky, nonplastic; common fine and very fine roots throughout; common very fine irregular pores; slightly acid, pH 6.5; abrupt smooth boundary.
^Cu—8 to 55 centimeters; light yellowish brown (2.5Y 6/3) sandy loam, olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; friable, very hard, nonsticky, nonplastic; highly compacted; common very fine roots throughout; common very fine irregular pores; 3 percent nonflat subangular indurated 2- to 5-millimeter and 4 percent nonflat subangular indurated 5- to 75-millimeter mixed rock fragments; 5 percent 2- to 75-millimeter bitumen (asphalt) fragments; highly compacted horizon; slightly alkaline, pH 7.8; clear smooth boundary.
^C1—55 to 75 centimeters; light yellowish brown (2.5Y 6/4) fine sandy loam, olive brown (2.5Y 4/4) moist; massive; very friable, moderately hard, nonsticky,

nonplastic; 2 percent nonflat subangular indurated 5- to 75 millimeter and 3 percent nonflat subangular indurated 2- to 5-millimeter sandstone fragments; moderately alkaline, pH 8.0; abrupt smooth boundary.

^C2—75 to 90 centimeters; light yellowish brown (2.5Y 6/4) sandy loam, olive brown (2.5Y 4/4) moist; massive; very friable, slightly hard, nonsticky, nonplastic; 5 percent nonflat subangular indurated 5- to 75-millimeter and 5 percent nonflat subangular indurated 2- to 5-millimeter mixed rock fragments; common faint variegations in matrix color from mechanical mixing; moderately alkaline, pH 8.0; abrupt smooth boundary.

^C3—90 to 100 centimeters; grayish brown (2.5Y 5/2) gravelly coarse sandy loam, very dark grayish brown (2.5Y 3/2) moist; massive; very friable, slightly hard, nonsticky, nonplastic; 7 percent nonflat subangular indurated 5- to 75-millimeter and 8 percent nonflat subangular indurated 2- to 5-millimeter mixed rock fragments; slightly alkaline, pH 7.8; clear smooth boundary.

^C4—100 to 110 centimeters; light olive brown (2.5Y 5/3) gravelly coarse sandy loam, olive brown (2.5Y 4/3) moist; massive; very friable, slightly hard, nonsticky, nonplastic; 5 percent nonflat subangular indurated 5- to 75-millimeter and 10 percent nonflat subangular indurated 2- to 5-millimeter mixed rock fragments; slightly alkaline, pH 7.8; abrupt smooth boundary.

^C5—110 to 200 centimeters; grayish brown (2.5Y 5/2) coarse sandy loam, very dark grayish brown (2.5Y 3/2) moist; massive; very friable, slightly hard, nonsticky, nonplastic; 4 percent nonflat subangular indurated 5- to 75-millimeter and 6 percent nonflat subangular indurated 2- to 5-millimeter mixed rock fragments; moderately alkaline, pH 8.0.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Thickness of human-transported materials: More than 200 cm or depth to bedrock contact, whichever is shallower

Artifacts: 0 to 15 percent construction debris

Depth to paralithic bedrock: Typically more than 200 cm; some pedons have a paralithic contact between depths of 75 and 150 cm

Reaction: Neutral to moderately alkaline

Calcium carbonate: Some pedons have disseminated calcium carbonate or calcium carbonate masses

Calcium carbonate equivalency: 0 to 5 percent throughout the profile

^A or ^Au horizon:

Dry color—2.5Y or 10YR 3/2, 3/3, 4/2, or 4/3

Moist color—2.5Y or 10YR 2/2, 3/1, 3/2, or 3/3

Texture—sandy loam or fine sandy loam; some surface horizons have fill materials with unpredictable textures

^C or ^Cu horizons:

Dry color—2.5Y or 10YR 5/2, 5/3, 6/3, 6/4, or 7/3

Moist color—2.5Y or 10YR 3/2, 3/3, 4/3, 4/4, or 5/3

Texture—sandy loam, fine sandy loam, or sandy clay loam or gravelly texture

Rock fragments—0 to 35 percent variable and mixed rounded and angular fragments; fill materials with unpredictable textures occur in some horizons

Typic Xerorthents, Warm

Typic Xerorthents, warm are shallow to deep, somewhat excessively drained soils that formed in material weathered from metamorphic and granitic rocks. These soils are on mountainsides and colluvial slopes. Elevation ranges from 725 to 1,086 meters. Slopes range from 55 to 90 percent. Annual precipitation ranges from 635 to 760 millimeters.

Taxonomic Classification

Typic Xerorthents

Typical Pedon

Typical pedon location information is not available. The component profile has been determined using field notes. Horizon colors are not available.

A—0 to 20 centimeters; gravelly sandy loam; weak fine granular structure; 25 percent 2- to 75-millimeter nonflat gravel; weakly acid, pH 6.5.

C—20 to 76 centimeters; very gravelly sandy loam; moderate fine subangular blocky and moderate medium subangular blocky structure; 45 percent 2- to 75-millimeter and 2 percent 75- to 250-millimeter coarse fragments; weakly acid, pH 6.5.

Cr—76 to 101 centimeters; moderately cemented granodiorite.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest. The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest. The warm phase name designates Typic Xerorthents with an elevation of less than 5,000 feet in the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Soil temperature: 15 to 22 degrees C

Depth to paralithic contact: 38 to 152 cm

A horizon:

Thickness—2.5 to 30 centimeters

Dry color—10YR 6/4, 6/3, 6/1, 5/4, or 5/3

Moist color—10YR 4/4, 4/2, 4/1, 3/4, or 3/2 or 2.5Y 4/2

Texture—gravelly or very gravelly sandy loam, loamy sand, gravelly loamy sand, cobbly sandy loam, or very cobbly loamy coarse sand

Rock fragment content—10 to 75 percent

C horizon:

Dry color—10YR 7/4, 7/3, 7/2, 5/4, 6/4, or 6/3

Moist color—10YR 6/3 or 5/4

Texture—very gravelly or very cobbly sandy loam or very gravelly, extremely gravelly, or very stony loam

Rock fragment content—35 to 85 percent

Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

Note—horizon typically grades into highly weathered and fractured rock

Vertic Calcixerolls

Vertic Calcixerolls consist of deep, well drained soils that formed in a thin layer of human-transported materials overlying residuum weathered from calcareous shale. These soils are on marine terraces and outcroppings of fan remnants. Slopes range from 2 to 12 percent. The mean annual precipitation is about 360 millimeters, and the mean annual temperature is about 17 degrees C.

Taxonomic Classification

Fine, smectitic, thermic Vertic Calcixerolls

Typical Pedon

Vertic Calcixerolls in an area of Urban land-Dapplegray-Vertic Calcixerolls complex, 3 to 12 percent slopes; Los Angeles County, California; San Pedro, 12 feet north and 12 feet east of sidewalk intersection by the intersection of Leland Street and 22nd Street; 33 degrees 43 minutes 27.81 seconds N. latitude and 118 degrees 18 minutes 3.91 seconds W. longitude, WGS 84 – U.S.G.S. Quad: San Pedro, California. (Colors are for dry soil unless otherwise noted.)

^Au1—0 to 9 centimeters; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure; very friable, slightly hard, moderately sticky, moderately plastic; common fine and very fine roots throughout; common very fine irregular pores; 1 percent plastic, 1 percent glass, and 1 percent brick 2- to 75-millimeter fragments; slightly effervescent; neutral, pH 7.0; clear smooth boundary.

^Au2—9 to 40 centimeters; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure; very friable, moderately hard, very sticky, moderately plastic; common fine and very fine and few medium roots throughout; common very fine irregular pores; clay films on all faces of peds; clay films were formed under natural conditions prior to modification and relocation; 4 percent nonflat subangular indurated 5- to 75-millimeter schist fragments; 1 percent plastic, 1 percent glass, and 1 percent brick 2- to 75-millimeter fragments; strongly effervescent; slightly acid, pH 6.5; clear smooth boundary.

2Btk1—40 to 63 centimeters; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate medium and coarse subangular blocky structure; friable, hard, moderately sticky, very plastic; few medium and fine and common very fine roots throughout; common very fine irregular pores; 25 percent faint clay films on all faces of peds; strongly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.

2Btk2—63 to 114 centimeters; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; friable, hard, moderately sticky, very plastic; common very fine roots throughout; common very fine irregular pores; 5 percent faint clay films on surfaces along pores and 15 percent faint clay films on all faces of peds; 3 percent fine distinct irregular white (10YR 8/1), dry, carbonate masses with clear boundaries in matrix; violently effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

2Bkk—114 to 122 centimeters; grayish brown (10YR 5/2) silt loam, dark gray (10YR 4/1) moist; weak medium subangular blocky structure; very friable, slightly hard, moderately sticky, moderately plastic; 10 percent medium distinct irregular moderately cemented white (10YR 8/1), dry, carbonate nodules with clear boundaries in matrix and 50 percent coarse faint irregular very pale brown (10YR 8/2), dry, carbonate masses with diffuse boundaries in matrix; 2 percent nonflat subangular indurated 2- to 5-millimeter schist fragments and 3 percent nonflat

subangular indurated 5- to 75-millimeter shale fragments; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.
2R—122 to 147 centimeters; strongly cemented shale.

Range in Characteristics

Note: These soils are mapped at the subgroup level due to their small extent and variable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 17 to 20 degrees C
Thickness of human-transported materials: 0 to 50 cm
Depth to lithic contact: 100 to 150 cm; some pedons with a bedrock contact below a depth of 150 cm are included in this concept
Depth to calcic horizon: 55 to 75 cm to calcium carbonate equivalency of 15 to 25 percent
Organic matter content: 1 to 4 percent at the surface; decreasing regularly in the natural material to about 1 percent at the bedrock contact

^A or ^Au horizons:
Dry color—10YR 3/1, 3/2, 4/2, 4/3, or 5/3
Moist color—10YR 2/1, 2/2, 3/1, 3/2, or 3/3
Texture—loam, silty clay loam, or clay loam
Reaction—slightly acid to slightly alkaline

2Btk horizons:
Dry color—10YR 3/2, 4/2, 4/3, 5/3, or 6/3
Moist color—10YR 2/1, 2/2, 3/1, 3/2, 3/3, 4/1, 4/2, or 4/3
Texture—silty clay loam, clay loam, or clay
Reaction—moderately alkaline
Calcium carbonate—few or common calcium carbonate masses

Bk or Bkk horizons (if they occur):
Dry color—10YR 3/2, 4/1, 4/2, 4/3, 5/2, 5/3, or 6/2
Moist color—10YR 3/2, 3/1, 3/2, 4/1, 4/2, 4/3, or 5/3
Texture—silt loam, silty clay loam, or clay loam
Reaction—moderately alkaline
Calcium carbonate—common or many calcium carbonate masses; few or common fine carbonate nodules occur in some pedons

Vista Family

The Vista family consists of moderately deep or deep, well drained soils that formed in material weathered from granitic, sedimentary, or gneissic rocks. These soils are on mountainsides, ridges, alluvial fans, and dissected pediments. Slopes range from 40 to 70 percent. Elevation ranges from 276 to 1,358 meters. Annual precipitation ranges from 560 to 860 millimeters.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Typic Haploxerepts

Typical Pedon (fig. 75)

Vista family sandy loam in an area of Vista-Trigo, granitic substratum-Modesto families complex, 40 to 70 percent slopes; Los Angeles County, California; approximately 1

Figure 75.—Location of representative profile of the Vista family in the Angeles National Forest.

mile east of Sky Haven Ranch on Forest Road 7N03, about 1,000 feet west and 800 feet north of the southeast corner; 34 degrees 40 minutes 33.75 seconds N. latitude and 118 degrees 24 minutes 58.76 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Lake Hughes, California. (Colors are for dry soil unless otherwise noted.)

A—0 to 23 centimeters; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak fine and weak medium granular structure; friable, slightly hard, slightly sticky, nonplastic; common very fine roots; many fine and many very fine tubular pores and many fine and many very fine interstitial pores; 5 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; neutral, pH 7.0; clear smooth boundary.

Bw1—23 to 74 centimeters; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; friable, hard, slightly sticky, nonplastic; few very fine roots; many fine and many very fine tubular pores and many fine and many very fine interstitial pores; 5 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; neutral, pH 7.0; clear smooth boundary.

Bw2—74 to 127 centimeters; very pale brown (10YR 7/4) sandy loam, brownish yellow (10YR 6/6) moist; massive; friable, hard, nonsticky, nonplastic; few very fine roots; many fine tubular pores and many very fine and many fine interstitial pores; 5 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; slightly acid, pH 6.5; gradual smooth boundary.

C—127 to 152 centimeters; very pale brown (10YR 7/4) gravelly sandy loam, brownish yellow (10YR 6/6) moist; massive; friable, slightly hard, nonsticky, nonplastic; few fine roots; many fine and many very fine interstitial pores; 15 percent nonflat subangular indurated 2- to 76-millimeter mixed rock fragments; slightly acid, pH 6.5.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Soil temperature: 15 to 21 degrees C
Depth to paralithic contact: 56 to 152 cm
Texture: Loam, sandy loam, fine sandy loam, or coarse sandy loam or the gravelly analogs of these textures
Rock fragments: 0 to 20 percent, by volume, 2- to 75-millimeter gravel
Reaction: Moderately acid to neutral (pH 5.6 to 7.3)

A horizon:
Dry color—10YR 6/3, 5/4, 5/3, 4/4, or 4/2
Moist color—10YR 4/3, 3/4, 3/3, 3/2, or 2/2 or 7.5Y 4/4

B horizons:
Dry color—10YR 7/4, 6/4, 6/3, 5/4, 5/3, or 4/4 or 7.5YR 5/4
Moist color—10YR 6/4, 4/4, 4/3, or 3/4 or 7.5YR 4/4
Clay content—less than 18 percent (slightly higher than in the A horizon)
Notes—clay bridges occur between mineral grains and colloid stains on mineral grains in some pedons; horizon is directly underlain by highly weathered granitic rock (Cr horizon) in some pedons

C horizon:
Dry color—10YR 7/4, 6/3, or 5/4; 2.5Y 5/4; or 7.5YR 6/6
Moist color—10YR 6/6, 4/4, or 4/3; 2.5Y 4/4; or 7.5YR 5/4
Texture—loam, sandy loam, fine sandy loam, coarse sandy loam, or loamy sand or the gravelly analogs of these textures

Vista Series

The Vista series consists of moderately deep, well drained soils that formed in material weathered from diorite. These soils are on side slopes of hills and mountains (fig. 76). Slopes range from 15 to 85 percent. The mean annual precipitation is about 520 millimeters, and the mean annual temperature is about 18.3 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Typic Haploxerepts

Typical Pedon (fig. 77)

Vista sandy loam in an area of Vista-Fallbrook-Cieneba complex, 30 to 75 percent slopes; Los Angeles County, California; City of Glendale, on a steep side slope near large utility pole landing in the San Rafael Hills, below Ridge Motorway fire road; 34 degrees 10 minutes 49.00 seconds N. latitude and 118 degrees 13 minutes 2.00 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Pasadena, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 5 centimeters; light olive brown (2.5Y 5/3) sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate medium granular structure parting to moderate fine granular; friable, soft, nonsticky, nonplastic; common fine and very fine tubular

Figure 76.—An area of Vista soil on a steep side slope west of Ridge Motorway, between Camino San Rafael and the Glendale Freeway in the San Rafael Hills. Photo taken looking southwest.

pores; 3 percent subangular 6- to 75-millimeter and 5 percent angular 2- to 5-millimeter diorite fragments; neutral, pH 6.7; clear broken boundary.

A2—5 to 9 centimeters; olive brown (2.5Y 4/3) sandy loam, very dark grayish brown (2.5Y 3/2) moist; moderate fine granular structure; friable, soft, nonsticky, nonplastic; common fine and very fine tubular pores; 3 percent subangular 6- to 75-millimeter and 5 percent angular 2- to 5-millimeter diorite fragments; neutral, pH 6.7; clear broken boundary.

A3—9 to 22 centimeters; olive brown (2.5Y 4/3) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; friable, soft, nonsticky, nonplastic; common fine and very fine tubular pores; 2 percent subangular 6- to 75-millimeter and 5 percent angular 2- to 5-millimeter diorite fragments; neutral, pH 6.7; clear wavy boundary.

Bw—22 to 54 centimeters; olive brown (2.5Y 4/4) sandy loam, olive brown (2.5Y 4/3) moist; weak fine subangular blocky structure; very friable, soft, nonsticky, nonplastic; common fine and very fine tubular pores; 2 percent subangular 6- to 75-millimeter and 3 percent angular 2- to 5-millimeter diorite fragments; slightly acid, pH 6.3; clear wavy boundary.

C1—54 to 63 centimeters; light olive brown (2.5Y 5/4) sandy loam, olive brown (2.5Y 4/3) moist; massive; very friable, soft, nonsticky, nonplastic; 3 percent subangular 6- to 75-millimeter and 5 percent angular 2- to 5-millimeter diorite fragments; slightly acid, pH 6.3; clear wavy boundary.

C2—63 to 78 centimeters; light olive brown (2.5Y 5/3) very gravelly sandy loam, olive brown (2.5Y 4/3) moist; massive; very friable, soft, nonsticky, nonplastic; 15 percent subangular 6- to 75-millimeter and 25 percent angular 2- to 5-millimeter diorite fragments; slightly acid, pH 6.3; clear wavy boundary.

Cr—78 to 103 centimeters; weakly cemented diorite.

Figure 77.—Representative profile of the Vista series. The Vista soil typically is sandy loam, has weak structure, and has a paralithic contact of weathered diorite or granite at a depth of 50 to 100 centimeters. Scale is in centimeters.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 22 degrees C
Depth to paralithic contact: 50 to 100 cm
Organic matter content: Average of less than 1 percent in the control section
Reaction: Slightly acid to slightly alkaline

A horizons:
Dry color—2.5Y or 10YR 4/3, 5/3, or 6/3
Moist color—2.5Y or 10YR 3/2, 3/3, 4/2, or 4/3
Texture—sandy loam
Rock fragment content—0 to 15 percent

Bw horizon:
Dry color—2.5Y or 10YR 4/4, 6/3, or 6/4
Moist color—2.5Y or 10YR 4/3 or 4/4
Texture—sandy loam or loamy sand
Rock fragment content—0 to 15 percent

C horizons:
Dry color—2.5Y or 10YR 5/3, 5/4, 6/3, or 6/4
Moist color—2.5Y or 10YR 4/3 or 4/4
Texture—sandy loam, loamy sand, or sand or gravelly or very gravelly textures
Rock fragment content—5 to 40 percent

Walong Series

The Walong series consists of moderately deep, well drained soils that formed in materials weathered from gneiss. These soils are on uplands in foothills (fig. 78). Slopes range from 15 to 45 percent. The mean annual precipitation is about 584 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls

Typical Pedon (fig. 79)

Walong sandy loam in an area of Padova-Walong complex, 30 to 85 percent slopes; Los Angeles County, California; Claremont Hills Wilderness Park; 34 degrees 8 minutes 47.00 seconds N. latitude and 117 degrees 42 minutes 43.00 seconds W.

Figure 78.—An area of Walong soil on a steep side slope at the Claremont Hills Wilderness Park.

Figure 79.—Representative profile of the Walong series. Walong soils have a mollic epipedon, weak structure, and a paralithic contact of gneiss at a depth of 50 to 100 centimeters. (Scale is in centimeters.)

longitude, NAD 83 – U.S.G.S. Quad: Mount Baldy, California. (Colors are for dry soil unless otherwise noted.)

A1—0 to 20 centimeters; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak medium granular structure; friable, soft, slightly sticky, nonplastic; common medium and very fine roots throughout; common fine tubular and common very fine interstitial pores; 3 percent angular 6- to 75-millimeter and 5 percent angular 2- to 5-millimeter gneiss fragments; moderately acid, pH 6.0; clear wavy boundary.

A2—20 to 47 centimeters; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate medium and moderate fine subangular blocky structure; very friable, soft, slightly sticky, nonplastic; common fine and many very fine roots throughout; common fine and very fine tubular pores; 3 percent nonflat subrounded very strongly cemented 5- to 75-millimeter and 5 percent nonflat subrounded very strongly cemented 2- to 5-millimeter mixed rock fragments; moderately acid, pH 6.0; clear wavy boundary.

Bt1—47 to 63 centimeters; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; friable, slightly hard, slightly sticky, nonplastic; few medium and fine roots throughout; common very fine tubular and common very fine interstitial pores; 5 percent faint clay bridges between sand grains; 1 percent angular 6- to 75-millimeter and 4 percent angular 2- to 5-millimeter gneiss fragments; moderately acid, pH 6.0; clear wavy boundary.

Bt2—63 to 85 centimeters; strong brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; friable, slightly hard, slightly sticky, nonplastic; few medium and coarse roots throughout; common medium tubular and common very fine interstitial pores; 5 percent faint clay bridges between sand grains; moderately acid, pH 6.0; gradual wavy boundary.

Cr—85 to 105 centimeters; weakly cemented gneiss.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 22 degrees C

Depth to paralithic contact: 50 to 100 cm

Organic matter content: 1 to 4 percent in the upper 50 cm; decreasing regularly to below 1 percent at a depth of 50 cm

Rock fragments: 0 to 15 percent gravel and isolated cobbles; some pedons have more than 15 percent rock fragments directly over a paralithic contact

Reaction: Moderately acid or slightly acid

A horizons:
Dry color—10YR 4/2, 4/3, 5/2, or 5/3
Moist color—10YR 2/2, 3/2, or 3/3
Texture—sandy loam

Bt or Bw horizons:
Dry color—10YR or 7.5YR 5/3, 5/4, or 6/2
Moist color—10YR or 7.5YR 3/3, 3/4, or 4/4
Texture—sandy loam
Note—in some pedons, clay films or bridging does not occur and clay increase does not occur or is negligible

C horizon (if it occurs):
Dry color—10YR 6/3, 6/4, or 7/4
Moist color—10YR 5/3, 5/4, or 6/3
Texture—sandy loam, coarse sandy loam, loamy sand, or sand or gravelly textures

Windfetch Series

The Windfetch series consists of well drained soils that formed in a thin discontinuous layer of human-transported materials overlying uplifted alluvium from marine and other mixed rock sources. These soils are on uplifted alluvium and terraces. Slopes range from 0 to 12 percent. The mean annual precipitation is about 368 millimeters, and the mean annual air temperature is about 18 degrees C.

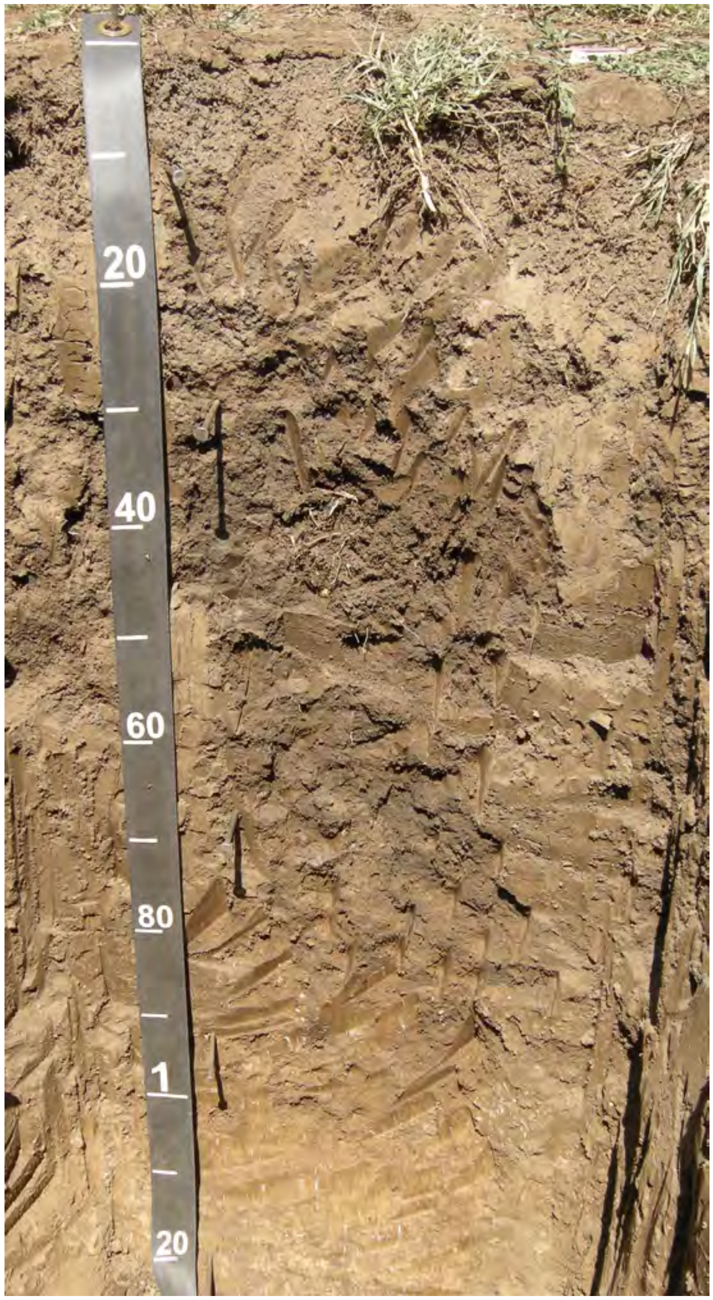


Figure 80.—Representative profile of the Windfetch series. This soil has a mollic epipedon and a weathered argillic horizon with masses of calcium carbonate.

Taxonomic Classification

Fine-loamy, mixed, superactive, thermic Calcic Argixerolls

Typical Pedon (fig. 80)

Windfetch loam in an area of Urban land-Windfetch-Centinela complex, 0 to 5 percent slopes; Los Angeles County, California; City of Inglewood, at Edward Vincent Jr Park near Warren Lane, parallel parking lot, between lot and paved walking path, in upland area; 33 degrees 58 minutes 23 seconds N. latitude and 118 degrees 20 minutes 40

seconds W. longitude, WGS 84 – U.S.G.S. Quad: Inglewood, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 10 centimeters; dark brown (7.5YR 3/2) loam, very dark gray (7.5YR 3/1) moist; moderate fine granular structure; very friable, moderately hard, moderately sticky, slightly plastic; common fine and very fine roots; common medium and very fine tubular pores; moderately acid, pH 5.8; clear wavy boundary.

^Au—10 to 30 centimeters; dark brown (7.5YR 3/2) clay loam, very dark gray (7.5YR 3/1) moist; moderate medium prismatic structure; friable, hard, moderately sticky, moderately plastic; common fine roots; common medium and very fine tubular pores; many clay films on faces of peds; clay films and soil structure are remnants of the source material; few artifacts; very slightly effervescent; slightly acid, pH 6.5; clear wavy boundary.

2Bt—30 to 67 centimeters; dark brown (7.5YR 3/3) clay loam, dark brown (7.5YR 3/2) moist; moderate medium prismatic structure parting to moderate coarse subangular blocky; friable, moderately hard, moderately sticky, moderately plastic; common medium roots; common medium and very fine tubular pores; many clay films on faces of peds; slightly alkaline, pH 7.4; clear wavy boundary.

2Btk1—67 to 94 centimeters; dark brown (7.5YR 3/4) clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; friable, very sticky, moderately plastic; common very fine roots; common very fine tubular pores; many clay films on faces of peds; common medium calcium carbonate masses; strongly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

2Btk2—94 to 120 centimeters; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; common very fine roots; common very fine tubular pores; many clay films on faces of peds; few fine distinct spherical black (10YR 2/1) manganese masses; finely disseminated calcium carbonate and common medium threadlike white (10YR 8/1) calcium carbonate masses; strongly effervescent; moderately alkaline, pH 7.9; clear wavy boundary.

2Btk3—120 to 160 centimeters; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; common very fine roots; common very fine tubular pores; common distinct clay films on faces of peds; few fine spherical black (10YR 2/1) manganese masses; finely disseminated calcium carbonate and few fine distinct irregular white (10YR 8/1) calcium carbonate masses; slightly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

2Bt´—160 to 200 centimeters; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; friable, moderately sticky, moderately plastic; common very fine roots; common very fine irregular pores; common distinct clay films on faces of peds; few fine distinct spherical black (10YR 2/1) manganese masses, few fine distinct irregular gray (10YR 5/1) iron depletions with sharp boundaries, and common medium distinct cylindrical iron-manganese masses with sharp boundaries surrounding redox depletions; very slightly effervescent; slightly alkaline, pH 7.7.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 17 to 20 degrees C

Thickness of human-transported materials: Less than 50 cm

Depth to secondary calcium carbonate: 40 to 105 cm

Clay content: 24 to 34 percent in the particle-size control section

Rock fragment content: 0 to 10 percent
Reaction: Slightly alkaline or moderately alkaline

^A or ^Au horizon:
Dry color—10YR or 7.5YR 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR or 7.5YR 2/2, 3/1, 3/2, or 3/3
Texture—loam, silt loam, fine sandy loam, or clay loam
Rock fragment content—0 to 5 percent
Organic matter content—1 to 3.5 percent; may be higher in imported surface material
Artifacts—0 to 5 percent
Electrical conductivity (EC)—2 to 4 decisiemens per meter

^C or ^Cu horizon (if it occurs):
Dry color—10YR or 7.5YR 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR or 7.5YR 3/1, 3/2, 3/3, or 4/3
Texture—loam, fine sandy loam, silt loam, or clay loam
Rock fragment content—0 to 5 percent
Artifacts—0 to 5 percent; individual horizons may have up to 20 percent artifacts
Electrical conductivity (EC)—2 to 4 decisiemens per meter

Bt or 2Bt horizons:
Dry color—10YR or 7.5YR 3/3, 3/4, 4/3, 4/4, 5/3, 5/4, or 6/3
Moist color—10YR or 7.5YR 3/2, 3/3, 3/4, 4/3, or 4/4
Texture—loam, silt loam, or clay loam
Clay content—24 to 34 percent
Rock fragment content—0 to 5 percent
Electrical conductivity (EC)—2 to 4 decisiemens per meter
Sodium absorption ratio (SAR)—5 to 12

Btk or 2Btk horizons:
Dry color—10YR or 7.5YR 3/4, 4/3, 4/4, 5/3, 5/4, 6/3, 6/4, or 7/4
Moist color—10YR or 7.5YR 4/3, 4/4, 5/3, 5/4, 5/6, or 6/4
Texture—clay loam or loam
Clay content—24 to 34 percent
Rock fragment content—0 to 5 percent
Electrical conductivity (EC)—2 to 4 decisiemens per meter
Sodium absorption ratio (SAR)—5 to 12

Wrentham Family

The Wrentam family consists of moderately deep or deep, well drained soils that formed in material weathered from granitic, sedimentary, or gneissic rocks. These soils are on mountainsides, ridges, alluvial fans, and dissected pediments. Slopes range from 60 to 80 percent. Elevation ranges from 402 to 1,830 meters. Annual precipitation ranges from 530 to 860 millimeters and typically is about 580 millimeters.

Taxonomic Classification

Loamy-skeletal, mixed, superactive, mesic Pachic Haploxerolls

Typical Pedon (fig. 81)

Wrentham family gravelly loam in an area of Tollhouse-Stukel-Wrentham families complex, 60 to 90 percent slopes; Los Angeles County, California; road cut on Mendenhall Ridge Road (Forest Road 3N32), between Mendenhall Saddle and Iron Mountain Saddle; 34 degrees 21 minutes 0.21 second N. latitude and 118 degrees 16

Figure 81.—Location of representative profile of the Wrentham family in the Angeles National Forest.

minutes 58.96 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Sunland, California. (Colors are for dry soil unless otherwise noted.)

Oe—0 to 8 centimeters; moderately decomposed plant material.

A—8 to 28 centimeters; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; very friable, soft, nonsticky, nonplastic; common very fine, common fine, and common medium roots; many fine and many very fine interstitial pores; 15 percent nonflat subangular indurated 2- to 76-millimeter gneiss fragments; neutral, pH 6.6; clear wavy boundary.

Bw1—28 to 84 centimeters; weak red (7.5R 5/4) very gravelly loam, dusky red (7.5R 3/2) moist; weak medium subangular blocky structure; friable, soft, nonsticky, nonplastic; common very fine, common fine, common medium, and common coarse roots; 10 percent nonflat subangular indurated 76- to 250-millimeter and 35 percent nonflat subangular indurated 2- to 76-millimeter gneiss fragments; neutral, pH 6.6; gradual wavy boundary.

Bw2—84 to 155 centimeters; light olive brown (2.5Y 5/4) extremely gravelly loam, olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; friable, slightly hard, nonsticky, slightly plastic; few very fine, few fine, common medium, and common coarse roots; many fine and many very fine interstitial pores; 50 percent 2- to 76-millimeter and 10 percent 76- to 250-millimeter nonflat subangular indurated gneiss fragments; neutral, pH 6.6; gradual wavy boundary.

R—155 to 180 centimeters; strongly cemented gneiss.

Range in Characteristics

Note: These soils are mapped at the family level due to the variability in soil properties. Some properties fall outside the range of characteristics for the suggested

named soil but were deemed representative at the time it was mapped at the order 4 level in the Angeles National Forest (circa 1980). The ranges in characteristic properties were derived from the soil survey report for the Angeles National Forest.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Soil temperature: 10 to 15 degrees C
Depth to lithic contact: 122 to more than 152 cm
Reaction: Slightly acid or neutral (pH 6.1 to 7.3) throughout the profile

A horizon:
Dry color—10YR 3/3, 3/2, or 3/1 or 2/5Y 3/2
Moist color—10YR 2/2 or 2/1
Texture—gravelly loam or stony sandy loam
Rock fragment content—15 to 35 percent

Bw horizons:
Dry color—10YR 5/4, 5/3, 4/6, 4/3, or 4/2 or 2/5Y 5/2
Moist color—10YR 3/3 or 3/2 or 2.5YR 3/2
Texture—very gravelly loam, cobbly loam, very cobbly loam, very stony sandy loam, or very stony loamy sand
Rock fragment content—35 to 60 percent
Note—some pedons do not have a B horizon

Xeropsamments

Xeropsamments consist of alluvial deposits located in stream or river channels that have an earthen bottom and intermittent surface water flow. These soils are mapped at the great group level due to unpredictable soil properties on the landscape. The soil profile is generally sandy in texture with a rock fragment content that increases upstream as the channel approaches the mountains. Stratification and lenses with silty texture are common in most pedons.

Xerorthents, Coarse Fill

Xerorthents, coarse fill consist of very deep, well drained soils that formed in human-transported materials over alluvium derived from granitic sources. These soils are on hillslope terraces and fan remnants with surface fill. Slopes range from 0 to 15 percent. The mean annual precipitation is about 480 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Xerorthents

Typical Pedon

Xerorthents, coarse fill in an area of Urban land-Montebello-Xerorthents complex, 0 to 15 percent slopes, terraced; Los Angeles County, California; City of Montebello, on a terraced recreation field; 34 degrees 1 minute 46.00 seconds N. latitude and 118 degrees 7 minutes 10.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: El Monte, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 17 centimeters; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak medium granular; friable, moderately hard, slightly sticky, slightly plastic; common fine,

common medium, and common very fine roots; common very fine interstitial pores; moderately alkaline, pH 8.0; abrupt wavy boundary.

^C1—17 to 32 centimeters; light brown (7.5YR 6/3) sandy clay loam, brown (7.5YR 4/2) moist; massive; friable, moderately sticky, moderately plastic; common fine roots; common very fine tubular and few very fine interstitial pores; faint clay bridges between sand grains; 3 percent fine faint irregular strong brown (7.5YR 4/6), moist, relict masses of oxidized iron in matrix; 2 percent 2- to 5-millimeter and 3 percent 6- to 75-millimeter mixed rock fragments; slightly alkaline, pH 7.8; clear wavy boundary.

^C2—32 to 60 centimeters; light brown (10YR 6/4) sandy loam and sandy clay loam, 90 percent dark yellowish brown (10YR 4/4) and 10 percent dark grayish brown (10YR 4/2) moist; massive; friable, slightly sticky, slightly plastic; few medium and common very fine tubular pores; 2 percent 2- to 5-millimeter and 3 percent 6- to 75-millimeter mixed rock fragments; slightly alkaline, pH 7.8; clear wavy boundary.

^C3—60 to 85 centimeters; pink (10YR 7/4) sandy loam, yellowish brown (10YR 5/6) moist; massive; friable, slightly sticky, slightly plastic; common very fine tubular pores; 3 percent 2- to 5-millimeter and 7 percent 6- to 75-millimeter mixed rock fragments; slightly alkaline, pH 7.8; clear wavy boundary.

^C4—85 to 103 centimeters; brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 3/2) moist; massive; friable, slightly sticky, slightly plastic; many very fine tubular pores; 1 percent fine prominent threadlike iron-manganese masses in matrix; 1 percent 6- to 75-millimeter and 1 percent 2- to 5-millimeter mixed rock fragments; slightly alkaline, pH 7.8; clear wavy boundary.

^C5—103 to 138 centimeters; light brown (7.5YR 6/4) sandy clay loam, strong brown (7.5YR 4/6) moist; massive; friable, very sticky, very plastic; many very fine tubular pores; 15 percent distinct clay films on all faces of peds; 2 percent 6- to 75-millimeter and 3 percent 2- to 5-millimeter mixed rock fragments; slightly alkaline, pH 7.6; clear wavy boundary.

2Bt—138 to 155 centimeters; pink (7.5YR 7/4) sandy clay loam, strong brown (7.5YR 5/6) moist; weak medium subangular blocky structure; friable, moderately sticky, very plastic; 10 percent distinct clay bridges between sand grains; 1 percent 6- to 75-millimeter and 4 percent 2- to 5-millimeter mixed rock fragments; neutral, pH 7.2.

Range in Characteristics

Note: These soils are mapped at the great group level due to their small extent and unpredictable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C
Thickness of human-transported materials: More than 125 cm
Reaction: Slightly alkaline or moderately alkaline

^A or ^Au horizon:
Dry color—10YR 5/3, 5/4, 5/6, or 6/3
Moist color—10YR 3/2, 3/4, or 4/3
Texture—sandy loam, loam, or sandy clay loam
Rock fragments—0 to 15 percent gravel
Artifacts—0 to 10 percent construction debris

^C or ^Cu horizons:
Dry color—10YR or 7.5YR 5/4, 5/6, 6/3, 6/4, or 7/4
Moist color—10YR or 7.5YR 3/2, 4/2, 3/4, 4/4, 4/6, 5/4, or 5/6

Texture—sandy loam or sandy clay loam
Rock fragments—0 to 15 percent gravel
Artifacts—0 to 10 percent construction debris

2Bt horizon:
Dry color—7.5YR 5/3, 5/4, 5/6, 6/4, 6/6, or 7/4
Moist color—7.5YR 4/4, 4/6, or 5/6
Texture—sandy clay loam or clay loam
Clay content—24 to 35 percent
Rock fragments—0 to 15 percent gravel

Xerorthents, Dredged Spoil

Xerorthents, dredged spoil consist of very deep, poorly drained soils that formed in dredge spoil and human-transported materials. These soils occur on constructed landforms in a filled tidal marsh. Slopes range from 0 to 2 percent. The mean annual precipitation is about 330 millimeters, and the mean annual temperature is about 17 degrees C.

Taxonomic Classification

Xerorthents

Typical Pedon

Xerorthents, dredged spoil in an area of Urban land-Aquic Xerorthents-Xerorthents, dredged spoil complex, 0 to 2 percent slopes; Los Angeles County, California; City of Long Beach, at Nichols Park; 33 degrees 45 minutes 47.00 seconds N. latitude and 118 degrees 7 minutes 3.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Los Alamitos, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 40 centimeters; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium granular structure; friable, nonsticky, nonplastic; 5 percent clay films; 5 percent coarse clay bodies in matrix; 5 percent angular 2- to 75-millimeter mixed rock fragments; 5 percent irregular 2- to 75-millimeter bitumen (asphalt) fragments; pockets of clay are mechanically mixed into horizon; moderately alkaline, pH 8.2; abrupt wavy boundary.

^Cu1—40 to 60 centimeters; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; massive; firm, very sticky, very plastic; 30 percent clay films on all faces of peds; 40 percent fine prominent masses of oxidized iron with diffuse boundaries in matrix; 5 percent coarse clay bodies in matrix; 2 percent irregular 2- to 75-millimeter concrete and 5 percent irregular 2- to 75-millimeter bitumen (asphalt) fragments; pockets of clay are mechanically mixed into horizon; moderately alkaline, pH 8.2; abrupt wavy boundary.

^Cu2—60 to 90 centimeters; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; friable, slightly sticky, slightly plastic; 5 percent clay films; 5 percent coarse clay bodies in matrix; 5 percent angular 2- to 75-millimeter mixed rock fragments; 2 percent irregular 2- to 75-millimeter concrete and 5 percent irregular 2- to 75-millimeter bitumen (asphalt) fragments; pockets of clay are mechanically mixed into horizon; moderately alkaline, pH 8.2; abrupt wavy boundary.

^Cu3—90 to 113 centimeters; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; firm, very sticky, very plastic; 2 percent flat 2- to 5-millimeter shell fragments and 5 percent angular 2- to 75-millimeter mixed rock fragments; 2 percent irregular 2- to 75-millimeter concrete and 5 percent irregular 2- to 75-millimeter bitumen (asphalt) fragments; moderately alkaline, pH 8.2.

Range in Characteristics

Note: These soils are mapped at the great group level due to their small extent and unpredictable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist within a depth of 50 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 17 to 20 degrees C
Thickness of human-transported materials: 200 cm or more
Depth to aquic conditions: 15 to 50 cm
Rock fragment content: 0 to 15 percent
Artifacts: 0 to 15 percent construction debris
Reaction: Slightly alkaline or moderately alkaline

^A or ^Au horizon:
Dry color—10YR 4/2, 4/3, or 5/4
Moist color—10YR 2/2, 3/1, 3/2, 3/3, or 4/4
Texture—sandy loam

^Cu horizons:
Dry color—2.5Y or 10YR 6/2, 6/3, or 7/1
Moist color—2.5Y or 10YR 4/2, 4/3, 5/1, 5/2, or 5/3
Texture—clay loam, sandy loam, or loam

Xerorthents, Landscaped

Xerorthents, landscaped consist of well drained soils that formed in human-transported materials on engineered terraces of hills and mountains. Slopes range from 0 to 60 percent. The mean annual precipitation is about 500 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Xerorthents

Typical Pedon

Xerorthents, landscaped in an area of Urban land-Xerorthents, landscaped complex, 0 to 5 percent slopes; Los Angeles County, California; about 2,300 feet west and 1,300 feet north of the southeastern corner of section 1, T. 1 S., R. 18 W.; 34 degrees 7 minutes 25.00 seconds N. latitude and 118 degrees 42 minutes 25.00 seconds W. longitude, NAD 27 – U.S.G.S. Quad: Malibu, California. The following abbreviated description depicts all known and available data.

A—0 to 10 centimeters; loam; weak fine subangular blocky structure; very friable, slightly hard, slightly sticky, slightly plastic; many fine and many very fine roots between peds; many fine and many very fine tubular pores; 5 percent nonflat angular very weakly cemented 2- to 75-millimeter mixed rock fragments; slightly effervescent; slightly alkaline, pH 7.4.
C—10 to 132 centimeters; loam; weak coarse and weak medium subangular blocky structure; very friable, slightly hard, slightly sticky, slightly plastic; many fine and many very fine roots between peds; many fine and many very fine tubular pores; 5 percent nonflat angular very strongly cemented 2- to 75-millimeter mixed rock fragments; slightly effervescent; slightly alkaline, pH 7.4.
Cr—132 to 157 centimeters; moderately cemented bedrock.

Range in Characteristics

Note: These soils are mapped at the great group level due to unpredictable soil properties that fall outside the range of characteristics for existing soil series and limited historical documentation.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Soil temperature: 18 to 21 degrees C
Thickness of human-transported materials: Entire soil profile is transported over a paralithic contact
Depth to paralithic contact: 25 to 200 cm or more
Texture in the particle-size control section: Loam, sandy loam, sandy clay loam, or silt loam
Clay content: 18 to 27 percent

Xerorthents, Shallow

Xerorthents, shallow consist of shallow, well drained soils that formed in human-transported materials on terraces of low hills. Slopes range from 10 to 35 percent. The mean annual precipitation is about 489 millimeters, and the mean annual temperature is about 18.6 degrees C.

Taxonomic Classification

Xerorthents

Typical Pedon

Xerorthents, shallow in an area of Urban land-Xerorthents-Osito complex, 10 to 35 percent slopes; Los Angeles County, California; Eagle Rock Recreation Center, on upper levelled hillslope terrace; 34 degrees 8 minutes 31.50 seconds N. latitude and 118 degrees 11 minutes 14.80 seconds W. longitude, WGS 84 – U.S.G.S. Quad: Pasadena, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 8 centimeters; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; friable, slightly hard, slightly sticky, slightly plastic; common medium and very fine roots; common very fine interstitial pores; slightly alkaline, pH 7.6; abrupt wavy boundary.
^Cu—8 to 22 centimeters; light yellowish brown (10YR 6/4) sandy loam, 5 percent very dark grayish brown (10YR 3/2) and 95 percent yellowish brown (10YR 5/4) moist; massive; friable, slightly sticky, nonplastic; few fine and very fine roots; few fine tubular and many very fine interstitial pores; 2 percent subangular 2- to 5-millimeter and 3 percent subangular 6- to 75-millimeter mixed rock fragments; 1 percent irregular 2- to 75-millimeter bitumen (asphalt) fragments; slightly alkaline, pH 7.6; clear wavy boundary.
^C—22 to 34 centimeters; light yellowish brown (10YR 6/4) loamy sand, yellowish brown (10YR 5/4) moist; massive; very friable, nonsticky, nonplastic; common very fine interstitial pores; 2 percent subangular 2- to 75-millimeter mixed rock fragments; slightly alkaline, pH 7.6; clear wavy boundary.
R—34 to 59 centimeters; lithic bedrock.

Range in Characteristics

Note: These soils are mapped at the great group level due to their small extent and unpredictable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture (in nonirrigated areas): Soil becomes moist some time between mid-October and December and remains moist until April or May
Mean annual soil temperature: 19 to 22 degrees C
Depth to lithic contact: 15 to 50 cm to lithic sandstone
Artifacts: 0 to 15 percent construction debris
Reaction: Slightly alkaline or moderately alkaline

^A or ^Au horizon:
Dry color—10YR 4/2, 4/3, or 5/3
Moist color—10YR 3/2 or 3/3
Texture—loam or sandy loam

^C or ^Cu horizon:
Dry color—10YR 5/4, 6/4, or 6/6
Moist color—10YR 3/2, 3/3, 4/3, 4/4, or 5/4
Texture—sandy loam or loamy sand

Xerorthents, Terraced

Xerorthents, terraced consist of very deep, well drained soils that formed in human-transported materials on smoothed and terraced slopes of alluvial fan remnants. Slopes range from 2 to 9 percent. The mean annual precipitation is about 373 millimeters, and the mean annual temperature is about 18 degrees C.

Taxonomic Classification

Xerorthents

Typical Pedon

Xerorthents, terraced in an area Urban land-Xerorthents, terraced-Centinela complex, 2 to 9 percent slopes; Los Angeles County, California; La Mirada Community Regional Park, north of pool area; 33 degrees 54 minutes 23.00 seconds N. latitude and 118 degrees 0 minutes 19.00 seconds W. longitude, NAD 83 – U.S.G.S. Quad: Whittier, California. (Colors are for dry soil unless otherwise noted.)

^A—0 to 15 centimeters; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; very slightly effervescent; moderately alkaline, pH 8.0 (Phenol red); abrupt wavy boundary.
^C1—15 to 65 centimeters; light brownish gray (10YR 6/2) and yellow (2.5Y 7/6) clay, dark grayish brown (10YR 4/2) and light olive brown (2.5Y 5/6) moist; massive; firm, very hard, very sticky, very plastic; 30 percent faint clay films on all faces of peds; calcium carbonate masses and clay films are remnants of the source material and developed prior to transport; very slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.
^C2—65 to 115 centimeters; pale yellow (2.5Y 7/4) clay loam and clay, light olive brown (2.5Y 5/4) moist; massive; firm, very hard, very sticky, very plastic; 20 percent distinct clay films on all faces of peds; calcium carbonate masses and clay films are remnants of the source material and developed prior to transport; moderately alkaline, pH 8.0; clear wavy boundary.
^C3—115 to 200 centimeters; pale yellow (2.5Y 7/4 and 7/3) silt loam, light olive brown (2.5Y 5/4 and 5/3) moist; massive; moderately sticky, moderately plastic; 30 percent medium prominent carbonate masses with clear boundaries in matrix; strongly effervescent; moderately alkaline, pH 8.2; calcium carbonate masses and clay films are remnants of the source material and developed prior to transport.

Range in Characteristics

Note: These soils are mapped at the great group level due to their small extent and unpredictable soil properties that fall outside the range of characteristics for existing soil series.

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May
Mean annual soil temperature: 18 to 21 degrees C
Thickness of human-transported materials: More than 2,000 cm
Artifacts: 0 to 10 percent construction debris
Calcium carbonate equivalency: 0 to 15 percent

^A or ^Au horizon:
Dry color—2.5Y or 10YR 4/2, 4/3, 5/2, 5/3, or 6/3
Moist color—2.5Y or 10YR 3/2, 3/3, or 4/3
Texture—sandy loam, loam, or clay loam

^C or ^Cu horizons:
Dry color—2.5Y or 10YR 6/2, 6/3, 7/3, or 7/4
Moist color—2.5Y or 10YR 4/2, 4/3, 4/4, 5/4, 5/4, 5/6, or 6/4
Texture—clay loam, clay, silt loam, loam, or sandy loam

Zaca Series

The Zaca series consists of deep, well drained soils that formed in materials weathered from calcareous sedimentary rocks. These soils are on rolling to very steep hills (fig. 82). Slopes range from 10 to 75 percent. The mean annual precipitation is about 446 millimeters, and the mean annual temperature is about 18.3 degrees C.

Figure 82.—An area of Zaca soil in a fire break on the rounded hills in San Demas. Photo taken north of the campus of California State Polytechnic University in Pomona and the I-10 Freeway.

Figure 83.—Representative profile of the Zaca series. This soil has a high shrink-swell potential, but cracks do not extend to the surface. Scale is in centimeters.

Taxonomic Classification

Fine, smectitic, thermic Vertic Haploxerolls

Typical Pedon (fig. 83)

Zaca clay in an area of Zaca-Apollo, warm complex, 20 to 55 percent slopes; Los Angeles County, California; City of San Dimas, 50 meters south and 65 meters west of the intersection of San Dimas Avenue and Calle Petalula; 34 degrees 3 minutes 55.00 seconds N. latitude and 117 degrees 49 minutes 14.00 seconds W. longitude, WGS 84 – U.S.G.S. Quad: San Dimas, CA. (Colors are for dry soil unless otherwise noted.)

Ap—0 to 21 centimeters; very dark grayish brown (10YR 3/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; firm, very hard, very sticky, very plastic; common fine tubular and common very fine interstitial pores; strongly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Bkss1—21 to 53 centimeters; very dark grayish brown (10YR 3/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium wedge structure parting to moderate medium subangular blocky; firm, very hard, very sticky, very plastic; common very fine tubular pores; 5 percent distinct pressure faces on peds and 5 percent distinct slickensides (pedogenic) on all faces of peds; 5 percent fine distinct irregular light gray (10YR 7/2) carbonate masses in matrix; 3 percent angular weakly cemented 2- to 75-millimeter sandstone fragments; strongly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

Bkss2—53 to 94 centimeters; yellowish brown (10YR 5/4) clay, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; friable, very hard, very sticky, very plastic; common very fine tubular pores; 5 percent distinct pressure faces on peds and 5 percent distinct slickensides (pedogenic) on all faces of peds; 10 percent fine prominent irregular white (10YR 8/1) carbonate masses in matrix; 3 percent angular weakly cemented 2- to 75-millimeter sandstone fragments; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk—94 to 135 centimeters; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; friable, hard, very sticky, very plastic; common very fine interstitial pores; 15 percent fine distinct irregular light gray (10YR 7/1) carbonate masses in matrix; 10 percent angular weakly cemented 2- to 75-millimeter sandstone fragments; very slightly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Cr—135 to 160 centimeters; moderately cemented calcareous siltstone.

Range in Characteristics

Soil moisture: Soil becomes moist below a depth of about 30 cm some time between October and December and remains moist in some part between depths of about 30 and 90 cm until April or May

Mean annual soil temperature: 18 to 21 degrees C

Depth to paralithic contact: 95 to 175 cm

Reaction: Slightly alkaline or moderately alkaline throughout the profile

Effervescence: Slight to strong in upper horizons and violent in lower horizons

A horizon:

Dry color—10YR 3/2, 3/3, 4/2, 4/3, or 5/3
Moist color—10YR 2/2, 3/1, 3/2, or 3/3
Texture—clay, silty clay, or clay loam
Rock fragment content—0 to 5 percent

Bkss, Bss, or Bk horizons:

Dry color—10YR 3/2, 3/3, 4/3, 5/4, 6/3, 6/4, or 7/4
Moist color—10YR 3/2, 3/3, 4/3, 5/4, or 6/4
Texture—clay, silty clay, or clay loam
Calcium carbonate—finely disseminated or common to many carbonate masses
Calcium carbonate equivalency—3 to 8 percent in upper part of horizon and 5 to 15 percent in lower part
Rock fragment content—0 to 10 percent in most pedons; some pedons have up to 25 percent in horizon directly over the paralithic contact

Cr horizon:

Texture—extremely weakly cemented to moderately weakly cemented marine sediments

Justification for Higher Categories

In many cases, soils could not be correlated to existing series nor a new soil series set up. This section outlines and lists the reasons for each higher category taxonomic unit above the series level.

Family Level Components

The following soils did not fit any series and did not have enough acreage for establishment of a new soil series:

Anthraltic Xerorthents, loamy substratum
Aquic Xerorthents
Aquic Xerorthents, graded
Aquic Xerorthents, fine substratum
Calcic Haploxerepts
Cumulic Haploxerolls
Lithic Argixerolls
Lithic Haploxerolls
Mollic Haploxeralfs (these soils also have highly variable textures and unpredictable horizon sequences)
Pachic Haploxerolls
Typic Fluvaquents
Typic Haploxeralfs
Typic Haploxerolls
Typic Xerorthents, coarse substratum
Typic Xerorthents, dredged spoil
Typic Xerorthents, terraced
Typic Xerorthents, coarse substratum
Typic Xerorthents, fine substratum
Typic Xerorthents, coarse
Typic Xerorthents, sandy substratum
Typic Xerorthents, landscaped
Typic Xerorthents, calcareous
Vertic Calcixerolls

Higher Categories Originating from the Join with the Soil Survey of Angeles National Forest Area

Forest Service soil components from Angeles National Forest Area were named as “family” using a different convention than is currently used. The series names were meant to represent the family in which they occur. This convention is not acceptable by modern standards; however, there is no data available at this time to properly recorrelate all family series names used in the adjacent soil survey of the Angeles National Forest Area. The series family components joining with the southeastern part of Los Angeles County include the following:

Caperton family
Chilao family
Etsel family
Exchequer family
Kilburn family
Lodo family
Modesto family
Modjeska family
Olete family

San Andreas family
Stukel family
Tollhouse family
Trigo family
Vista family
Wrentham family

Taxonomic Units above Family Level

Haploxeralfs. These soils have high variability of surface textures and thickness above the argillic horizon. Some areas have human-transported materials (HTM) overlying a thin veneer of eolian sands, some have natural eolian sands over the argillic horizon, and some have graded alluvium at the surface. The textures in the argillic horizon are also variable and cross particle-size class boundaries. Areas of these soils are small acreages.

Haploxerepts. These soils consist of landslide deposits and have a high degree of variability in texture, horizons, depth to bedrock, and distribution of calcium carbonate.

Typic Xerorthents, terraced. These soils formed in human-transported materials. Observed data in the field confirms highly variable soil properties that could not be clearly separated. The classification cannot be determined to below the subgroup level. The soil composition is unpredictable in important soil properties, including texture and depth.

Typic Xerorthents, calcareous substratum. These soils formed in human-transported materials. Observed data in the field confirms highly variable soil properties that could not be clearly separated. The classification cannot be determined to below the subgroup level. The soil composition is unpredictable in important soil properties, including texture, rock fragment content, and bulk density.

Xeropsamments. This higher category is used to characterize the sandy (sometimes cobbly) stratified sandy fluvial alluvium in the river bottoms in the greater Los Angeles area. Tujunga/Metz soil components cannot be confirmed due to the mixed mineralogy in this system, so a higher category of Xeropsamments is being used. The Tujunga/Soboba soils catena is expected in the northern part of the Los Angeles/San Fernando valleys. Moving south, there is mixing with the sedimentary hills where the Metz/Corralitos/Cortina catena can be expected. This landscape cannot be taken to the subgroup level because of uncertainty in the depth to water table. The earthen bottom sections of the Los Angeles and San Gabriel Rivers (including their tributaries) are lined with concrete in suitable areas, except where springs are present. These are short sections of the stream and river channels where onsite observations were not available. One geotechnical report confirms the presence of sandy material with stratified layers of cobbles and stones.

Xerorthents. These soils have highly variable textures and unpredictable horizon sequences.

Xerorthents, dredged spoil. These soils formed in human-transported materials. Observed data in the field confirms highly variable soil properties that could not be clearly separated. The classification cannot be determined to below the great group level. The soil composition is unpredictable in important soil properties, including texture, rock fragment content, and bulk density.

Xerorthents, terraced. The human-transported materials were found to be inconsistent in texture, with clay percentages ranging from 15 to up to 50 percent. Concentrations of calcium carbonate were also highly variable. This is a reasonable concept for a map unit consisting of high clay soils with pockets of highly concentrated calcium carbonate. Soil amendments are necessary for most land use applications on soils with the native properties.

Xerorthents, coarse fill. These soils formed in human-transported materials. Field data confirms highly variable soil properties that could not be clearly separated.

The classification cannot be determined to below the great group level. The soil composition is unpredictable in important soil properties, including texture, rock fragment content, and bulk density.

Xerorthents, shallow. These soils formed in human-transported materials. Observed data in the field confirms highly variable soil properties that could not be clearly separated. The classification cannot be determined to below the great group level. The soil composition is unpredictable in important soil properties, including texture, depth class, rock fragment content, and bulk density.

Taxonomic Units above Family Level That Join from Adjacent Soil Surveys

Joining components that crossed into Los Angeles County, Southeastern Part (CA696) were used at face value. There is no current dataset from the CA696 investigations adequate to recorrelate or update the component names for the join components that reach far beyond the survey boundary into older non-modern soil surveys.

The following soils were historically mapped as “taxon above family,” and adequate data does not exist to update or recorrelate them:

Haploxerolls (join with Angeles National Forest)
Mollic Haploxeralfs (join with Angeles National Forest)
Typic Xerorthents, warm (join with Angeles National Forest)
Typic Xerorthents, landscaped (join with Santa Monica Mountains)
Xerorthents (join with Western San Fernando Valley)

Phase Names for Anthropogenic Soils and Impervious Areas

Phase terms are common in map unit names. They convey important information, such as soil properties and surface attributes, about the map unit and distinguish it from other map units. The classes (i.e., taxa) in any category of the taxonomic system that are used in naming map unit components may be subdivided to make a phase distinction. Phase terms were used in the Los Angeles soil survey to convey anthropogenic characteristics of the soil components. The following list gives the phase terms used in this survey and what they indicate. HTM is human-transported materials, and HAHT is human-altered or human-transported materials.

1. Calcareous—coarse textured HTM with calcium carbonate
2. Calcareous substratum—fine-loamy calcareous alluvium below HTM
3. Coarse—HTM from pulverized granitic, sandy soils on hillslope terraces
4. Coarse fill—graded eolian sands overlying clay in the Torrance and Hawthorne area
5. Coarse substratum—sand or sandy loam alluvium below HTM
6. Coastal—climatic separation for the moderated coastal climate
7. Commercial—commercial buildings in impervious areas
8. Dredged spoil—HAHT soils from dredged source that have a “dredgic” HAHT family class
9. Fine substratum—dark-colored genetic clay below HTM
10. Graded—HTM reworked and leveled for urban development
11. Industrial—industrial impervious areas
12. Landscaped—HTM on hillslope terraces in the Santa Monica Mountains
13. Loamy substratum—loamy subsoil below human-altered materials
14. Loamy surface—loamy HTM overlying eolian sands

15. Marine terrace escarpments—terrace escarpments along the coastline of the Palos Verdes Peninsula
16. Oil wells—impervious areas with oil wells and supporting infrastructure
17. Sandy substratum—sandy alluvium weathered from granitic sources below HTM
18. Terraced—HTM on hillslope terraces of engineered and reshaped slopes

Formation of the Soils

This section describes the factors of soil formation and how they relate to the soils in the survey area. It also discusses the geomorphic surfaces of the area.

Factors of Soil Formation

Soil is generally defined as a natural growing medium for plants. It covers the surface of the earth as a three-dimensional body and is made up of organic and mineral material. The characteristics and properties of soil are determined by physical and chemical processes that result from the interaction of five soil-forming factors. These factors are climate, including temperature and kind and amount of precipitation; living organisms, including plant cover and organisms living in and on the soil (including humans); the length of time that the soil-forming factors have been operating; parent material, including texture and structure as well as mineralogical and chemical composition; and topography, mainly its effects on internal and external soil properties, such as drainage, aeration, susceptibility to erosion, and exposure to the sun and wind (Jenny, 1941).

Soils are classified, mapped, and interpreted on the basis of various kinds of soil horizons and their arrangement. The degree and expression of the soil horizons is a reflection of the extent of the interaction of soil-forming factors with one or more soil-forming processes, including additions, removals, transfers, and transformations (Simonson, 1959). Important diagnostic surface horizons in the survey area include mollic and anthropic epipedons. Significant diagnostic features include human-transported materials; cambic, argillic, and calcic horizons; and depth to bedrock. The glossary defines these diagnostic terms.

Climate

Heat and moisture greatly influence soil formation. Warming of the soils by the sun induces plant growth where there is sufficient moisture, and roots penetrate and affect soil structure and organic matter content. Moisture from rainfall helps to break down rocks and soil particles to finer sizes. Plant nutrients are made soluble and moved within root zones. Water moves clay particles from A horizons and deposits them in B horizons with the passage of time, creating argillic horizons. The weathering of parent materials by chemical and physical processes occurs most rapidly in the wettest months of the year.

The southeastern part of Los Angeles County has a mild Mediterranean climate. Rainfall occurs mostly from about November or December until April or May. The remainder of the year is mostly dry, except on the coastal part of the Los Angeles Basin, which is regularly covered by the morning marine layer of fog. This morning fog provides additional moisture for plants throughout the year and usually evaporates by afternoon. In many of the terrace and hillside positions, the soils have high organic carbon concentrations in A horizons due to the dense, native plant growth. Many of the soils on the San Gabriel and Los Angeles River flood plains have coarse textures and

less organic carbon than soils in elevated positions of the fan remnant and hillsides. The soils with a high clay content retain more water as well as accumulate and retain a higher concentration of organic carbon throughout.

The alluvial fan remnants are more weathered than the adjacent landforms. The soils on the fan remnants have deep translocation of clays with argillic horizons, which extend below a depth of 100 cm in Azuvina soils and below a depth of 150 cm in Pierview soils. The combination of the warm climate, stability of the landscape, and precipitation inputs over time weathered the reddish argillic horizon visible today.

Organisms

The activities of living organisms, including soil flora, fauna, and humans, all influence the formation and morphology of soils. Flora break down soil particles, improve aggregation, and provide organic inputs. Bacteria and fungi help decompose organic matter. Fauna, such as earthworms, small insects, and rodents, mix soil material through burrowing and tunneling. Abandoned tunnels commonly are filled with loose material from the overlying horizons and transmit water more readily than the surrounding undisturbed soil material. Humans mix and use soils as a construction medium.

Much of the natural vegetation has since been replaced with ornamental plants throughout the Los Angeles Basin and the coastal valleys. Prior to urban development, the coastal plain and valleys were covered with grasslands, shrublands, woodlands, and chaparral. The abundant vegetation contributed to a high content of organic carbon in soils in positions on hills, terraces, uplifted alluvium, and parts of the flood plains.

Burrowing organisms, such as gophers, earthworms, and insects, mix and homogenize the soils. Some soils, such as Sorrento soils, have clay films on the surfaces of peds, which indicated clay translocation vertically through the soil.

On the dense urban landscape, humans have played a major role in partly or completely altering soil properties. These changes include both physical and chemical soil properties. The degree and extent of soil alteration is variable throughout the survey area. In many landscaped areas with subtle slopes on the coastal plains and valleys, humans smoothed the soil surface and spread local soil material at construction sites. External materials were mixed into the soils as needed, and materials were added to the surface for turf establishment. In the hills, entire hillsides were reshaped and terraced to support urban development (fig. 84). After construction, onsite management practices, such as irrigation, accelerated soil formation.

Time

Time is expressed through characteristics of soil horizons. Young soils, such as Palmview soils on alluvial fans, have few distinctive characteristics and no diagnostic subsurface horizons. Soils on stable, elevated surfaces have had time to develop distinctive profile characteristics. For example, Windfetch soils have argillic and secondary carbonate diagnostic subsurface horizons.

Soils in broad flood plains and alluvial fans of the coastal plain and valleys are largely young and undeveloped. They have been deposited and reworked during flooding events of the Los Angeles, San Gabriel, and Ballona Rivers and Walnut Creek. Some of these soils have calcium carbonate accumulations in the subsoil, especially in areas south of the sedimentary hills. Examples are Tujunga, Palmview, Pico, Metz, San Emigdio, and Hueneme soils.

The alluvial fan remnant and uplifted terraces are located on elevated terraces above the alluvial fans of the flood plain. Soils in these areas are older and have had more time to weather and develop argillic horizons and, in some cases, secondary

Figure 84.—Construction of hillslope terraces. Hills are reshaped and stabilized for residential or commercial development.

calcium carbonate accumulations. Examples are Pierview, Azuvina, Windfetch, and Thums soils.

The soils of the hills and mountains have less weathering due to the steepness of slopes and soil creep. They are typically weakly developed, except in the stable positions of north- and east-facing slopes. Soils on many of the south- and west-facing slopes have developed secondary calcium carbonate accumulations and calcic horizons, due to the parent material.

The sand dunes along the coast, as represented by the Marina series, have weathered lamellae forming on the stabilized dunes. The narrow band of dunes bordering the beaches was deposited more recently and is continually reshaped by winds. The active dunes, as represented by the Abaft series, have not had time to form lamellae.

Parent Material

The San Gabriel Mountains, Verdugo Mountains, San Rafael Hills, and eastern part of the Santa Monica Mountains are dominantly granitic or diorite. Slopes weather, leading to the formation of coarse grained soils on hillsides. Sediments erode from these hills and are deposited below in the San Fernando, La Crescenta, San Gabriel, and Pomona Valleys. The alluvial soils that form reflect the nature of the granitic parent materials and are generally coarse and weakly developed. On older landscapes on fan remnants, soils are more weathered and have a reddish argillic horizon and a clay increase in the subsoil.

The band of sedimentary hills connecting the Puente Hills to the Elysian Hills are dominantly calcareous siltstone and shale with pockets of noncalcareous sandstone

or conglomerate. The soils on these hills are commonly high in clay and have calcium carbonate masses or, in some cases, a calcic horizon.

On the alluvial fans that weathered from the sedimentary hills, soils formed in alluvium and have a moderate to high clay content and they mostly contain calcium carbonate on the piedmont slopes. Further downstream, on the Los Angeles and San Gabriel River flood plains, calcareous sedimentary deposits mixed with the granitic depositions from the mountains to the north. Soils formed in this mixed alluvium are coarse and have calcium carbonate, mostly south of the calcareous sedimentary hills.

Aspect and Topography

Slope orientation, or aspect, is important to soil formation in the foothills and mountains of the southeastern part of Los Angeles County. South- and southwest-facing slopes receive direct sunlight for most of the day. The combination of solar radiation and heat dries soils quickly and limits plant growth to brush and grasses. These slopes have higher soil temperatures than north- and northeast-facing slopes. The soils are typically shallower than those on the north-facing slopes. They also have higher concentrations of calcium carbonate and calcic horizons, as in Balcom soils.

The north-facing slopes have more moisture, higher organic carbon content, and more weathering. Vegetation is dense with thick shrubs, grasses, poison oak, and trees. The soils are deeper, have higher organic carbon content, and have an argillic horizon where they occur on a stable landform.

Slope steepness plays a role in erosion, mass movement, and soil hydrology. Steep slopes erode quickly and are more likely to become unstable. Steeper slopes also increase surface runoff and decrease infiltration and the vertical flow of water through the soil profile. Lesser slopes allow water to infiltrate and increase the rate of internal soil weathering processes.

Topography dictates the flow direction of surface water, i.e., the surface hydrology and subsurface through-flow. As a result, soil genesis is directly linked to soil hydrology, which is greatly controlled by topography.

Geomorphic Surfaces

A geomorphic surface is an identifiable area of the earth’s surface that has a common landscape history; the area is of similar age and is formed by a set of processes during an episode of landscape evolution. Geomorphic surfaces are readily mappable landforms used in soil survey to find similar soils on similar landforms. They are most evident and useful on alluvial fans, flood plains, terraces, and basins. Geomorphic surfaces can be constructional, such as the deposition of alluvium along streams, or erosional, such as the wearing away of the surface on older hillsides.

The sequence of geomorphic surfaces is described from the newest, and usually the youngest, surface to the highest, and usually the oldest. In the southeastern part of Los Angeles County, this sequence ranges from the Pacific Ocean to the foothills of the San Gabriel Mountains.

The first geomorphic surfaces starting at the lowest point of deposition are the alluvial fans, flood plain, stream channels, tidal marsh, and beaches. These positions are located along the rivers and streams in the coastal plain and valleys. Today, most areas in the Los Angeles Basin of the lower geomorphic surface are protected from flooding and deposition by flood-control structures and channelized stream channels.

The alluvial fans in the northern and northwestern parts of the survey consist of alluvium weathered from granitic rocks. Rock fragment content can exceed 35 to 75 percent in the Soboba soils near canyon openings and alluvial fans close to the mountains. Palmview and Tujunga soils make up most of the alluvial fans in the northern area that receive direct inputs from the San Gabriel Mountains.

In the alluvial fans and flood plains located south of the sedimentary hills, the well drained San Emigdio soils and somewhat poorly drained Hueneme soils are common. The Metz series occurs immediately adjacent to the river channels. The somewhat poorly drained Biscailuz series occurs along the northeastern margin of elevated landforms and in low-lying areas of the alluvial fans. The alluvial fans that weathered from the Santa Monica Mountains area are represented by the Grommet series. This geomorphic surface is mostly Holocene-age alluvial deposition.

Along the ocean front, sand dunes blanket the coastline and extend inland, in some cases up to 3 or 4.5 miles. The dunes formed as sand from the coastline was blown east. A narrow band of steep dunes oriented parallel to the beach are late Holocene in age and are represented by Abaft soils. Further inland, the dunes are naturally stabilized and are late to middle Pleistocene in age. Soils in these areas exhibit lamellae. The stabilized dunes are represented by Marina soils.

The alluvial lowlands and uplifted alluvial terraces are east of the sand dunes and west of the Los Angeles River flood plain. They are mostly represented by Centinela soils in the clayey bottom and by the more weathered Windfetch and anthropogenic soils on the terraces and uplifted alluvium. Pockets of the clayey Centinela soils are also on uplifted portions of the landscape. The low terraces also have Typic Haploxerolls, which are coarse alluvial soils that filled in dips and depressions after the material was uplifted. This geomorphic surface is late to middle Pleistocene in age.

Moving up the alluvial fans, the landscape gives way to the alluvial fan aprons and incised alluvial fans that dissect the fan remnants. This geomorphic surface occurs on alluvial fans slightly higher than the lower flood plains. It has finer and siltier textures; it formed as sediment eroded from the sedimentary hills and was deposited along their perimeter. This surface occurs further away from the major river and stream channels and infrequently floods or does not flood in the lowest positions on the current landscape. Soils are Ballona, Cropley, Grommet, and Sorrento. These soils were very productive for agricultural uses in past years.

The elevated alluvial fan remnants and uplifted alluvial terraces stand above the lower alluvial fans. Deposition no longer occurs as the streams are incised into the lower alluvial fans. This geomorphic surface occurs below the mountains and hills in areas that have not been eroded or down-cut by steams. Soils are Azuvina, Montebello, Pierview, Thums, and Sepulveda. These soils have a well developed argillic horizon in the subsoil, except in human-transported materials. Azuvina, Windfetch, and Thums soils have higher contents of organic matter in the surface horizons because of the native vegetation of oaks and grasses. This geomorphic surface is identified as late to middle Pleistocene in age.

The hills running from the Puente Hills to the Elysian Hills are uplifted sedimentary hills with mostly calcareous bedrock. These hills have a rolling or rounded appearance. This band of sedimentary hills separates the upper and lower alluvial fans and provides calcium carbonate inputs for the alluvium below. Prominent soils are Anaheim, Apollo, Buzzpeak, Cieneba, Chumash, Dapplegray, Fontana, Filiorum, Gaviota, Kawenga, Lunada, Nacimiento, Oceanaire, and Zaca. Anthropogenic soils are on the hillslope terraces. This geomorphic surface is mostly Miocene to early Pliocene in age.

The highest geomorphic surface of the natural toposequence is the foothills of the San Gabriel Mountains, Verdugo Mountains, and San Rafael Hills. The soils on these hills are generally weakly developed due to the steep and unstable slopes. As these slopes erode, alluvial fan deposits form and fill the valleys below. The foothills commonly have less steep hillsides and soils that are highly weathered with red argillic horizons. These soils include Cieneba, Fallbrook, Padova, and Vista and several classified at the family level.

Anthropogenic geomorphic surfaces occur throughout the survey area. Many of the natural landforms have been altered by engineering or past agricultural practices.

For example, the natural undulated microtopography found on the Los Angeles and San Gabriel River flood plain has been extensively planed and smoothed, leaving behind a very smooth and flat appearance. Many of the hillsides have been partially or completed reshaped. Human alterations to these surfaces occurred over time as land use needs changed. This survey targeted the natural geomorphic surfaces and further separated the anthropogenic surface features. There are 27 anthropogenic soils identified in the survey area. Five of these anthropogenic soil types have significant acreage, namely Arbolado, Counterfeit, Dapplegray, Montebello, and Sepulveda soils.

References

Bilodeau, W.L., S.W. Bilodeau, M.G. Gath, M. Oborne, and R.J. Proctor. 2007. Geology of Los Angeles, California, United States of America. The Geological Society of America, Environmental and Engineering Geoscience, Vol. XIII, No. 2, May 2007, pp. 99-160.

City of Los Angeles. History of Los Angeles. https://www.lacity.org./your-government/government-information/history-los-angeles (Accessed 5 June 2017)

Craul, P.J. 1999. Urban soils, applications and practices. John Wiley & Sons, Inc., New York.

Discover Los Angeles. 2016. Historical timeline of Los Angeles. http://www.disvocerlosangeles.com/blog/historical-timelines-los-angeles (Accessed 5 June 2017)

Hernandez, L., M. Levin, J. Calus, J. Galbraith, E. Muñiz, K. Ryan, R. Riddle, P.K. Shaw, R. Dobos, S. Peaslee, S. Southard, D. Surabian, and D. Lindbo. 2017. Urban soil mapping through the United States Cooperative Soil Survey. *In* R. Lal and B.A. Stewart (eds.) Urban Soils. CRC Press, Boca Raton, Florida.

Jenny, Hans. 1941. Factors of soil formation.

Pouyat, R.V., I.D. Yesilonis, J. Russell-Anelli, and N.K. Neerchal. 2007. Soil chemical and physical properties that differentiate urban land-use and cover types. Soil Science Society of America Journal 71:1010-1019.

Scullin, C.M. 1983. Excavation and grading code administration, inspection, and enforcement. Prentice-Hall, Englewood Cliffs, New Jersey.

Simonson, Roy. W. 1959. Outline of a generalized theory of soil genesis. Soil Science Society of America Journal 23:152-156. DOI:10.2136/sssaj1959.03615995002300020021x.

Simpson, K. 2012a. Glory days of the Los Angeles River. KCETLink Media Group. https://www.kcet.org/history-society/glory-days-of-the-los-angeles-river (Accessed 5 June 2017)

Simpson, K. 2012b. Los Angeles flood of 1938: Cementing the river’s future. KCETLink Media Group. https://www.kcet.org/history-society/los-angeles-flood-of-1938-cementing-the-rivers-future (Accessed 5 June 2017)

Simpson, K. 2012c. Los Angeles flood of 1938: The destruction begins. KCETLink Media Group. https://www.kcet.org/history-society/los-angeles-flood-of-1938-the-destruction-begins (Accessed 5 June 2017)

Soil Survey Division Staff. 2017. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://soils.usda.gov/technical/

Soil Survey Staff. 1999. Soil Taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2014a. Buried soils and their effect on taxonomic classification. Soil Survey Technical Note No 10. USDA Natural Resources Conservation Service, Washington, DC.

Soil Survey Staff. 2014b. Keys to Soil Taxonomy, 12th ed. USDA Natural Resources Conservation Service, Washington, DC.

Stein, E.D., S. Dark, T. Longcore, N. Hall, M. Beland, R. Grossinger, J. Casanova, and M. Sutula. 2007. Historical ecology and landscape change of the San Gabriel River and floodplain. Southern California Coastal Water Research Project Technical Report No. 499.

Thomas, G.T., J.J. Landy, and R.J. Turney. 1961. Planned utilization of the ground water basins of the coastal plain of Los Angeles County, Appendix A. Ground water geology: State of California Department of Water Resources Southern District, Bulletin No. 104.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and Pacific Basin. U.S. Department of Agriculture Handbook 296.

University of California, Division of Agriculture and Natural Resources. 2010. Los Angeles agriculture, from cows to concrete: A history of Los Angeles agriculture. http://ucanr.edu/blogs/blocore/postdetail.cfm?postnum—3050 (Accessed 6 June 2017)

Western Regional Climate Center. 2016. Los Angeles DWTN USC Campus, California (045115). http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5115

Wikipedia. 2017. History of Los Angeles. https://en.wikipedia.org/wiki/History_of_Los_Angeles (Accessed 5 June 2017)

Woodring, W.P., M.N. Bramlette, and W.S.S. Kew. 1946. Geology and paleontology of the Palos Verdes Hills, California. U.S. Geological Survey Professional Paper 207, Denver, CO.

Yerkes, R.F., and R.H. Campbell. 2005. Preliminary geologic map of the Los Angeles 30’ x 60’ Quadrangle, Southern California. U.S. Geologic Survey Open-File Report 2005-1019, Denver, CO, scale 1:100,000. Available at http://pubs.usgs.gov/of/2005/1019/.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

Artifacts. Material created, modified, or transported from their source by humans usually for a practical purpose in habitation, manufacturing, excavation, agriculture, or construction activities.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canyon. A long, deep, narrow, very steep-sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; it was deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.
Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.
Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.
Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.
Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.
Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.
Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.
Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.
Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.
Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.
Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.
Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.
Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.
Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.
Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.
Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.
Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded. Refers to soil that has been mechanically worked by non-agricultural and purposeful human activity.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

HAHT. Human-altered and human-transported soil and materials.

Human-altered materials. A parent material for soil that has undergone anthroturbation (soil mixing or disturbance by humans).

Human-transported materials. A parent material for soil that has been moved horizontally onto a pedon from a source area outside of that pedon by purposeful human activity, usually with the aid of machinery or hand tools.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma *in situ* because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth; or the genetic profile below a layer of human-transported or human-altered materials.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum; natural soil below a thick layer of human-transported materials.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth’s surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Appendix—Climate Summaries by Soil Climate Zones

Temperature and precipitation data are predicted by the Parameter-elevation Regression on Independent Slopes Model (PRISM). PRISM data are then processed by the Mapunit Summary Model (MUSum), which statistically summarizes and displays a distribution of values (percentiles) for categories in each soil mapping climate zone.

This report is designed to provide statistical summaries of the environmental properties for one or more units zones. Summaries are based on raster data extracted from fixed-density sampling of map unit polygons. Percentiles are used as robust metrics of distribution central tendency and spread. For background information, please see the document "R-Based Map Unit Summary Report Introduction and Description" (available from the Pacific Region Soil Survey Office or the local soil survey office that services the soil survey area of Los Angeles County, Southeastern Part).

Table of Median Values

Climate Zone	Mean annual air temp. (degrees C)	Mean annual precip. (mm)	Number of frost-free days	Number of growing degree days
1	17.78	330	365	2,889
2	18.57	355	365	3,169
3	19.29	435	364	3,353
4	18.86	450	364	3,223
5	18.25	541	361	3,065

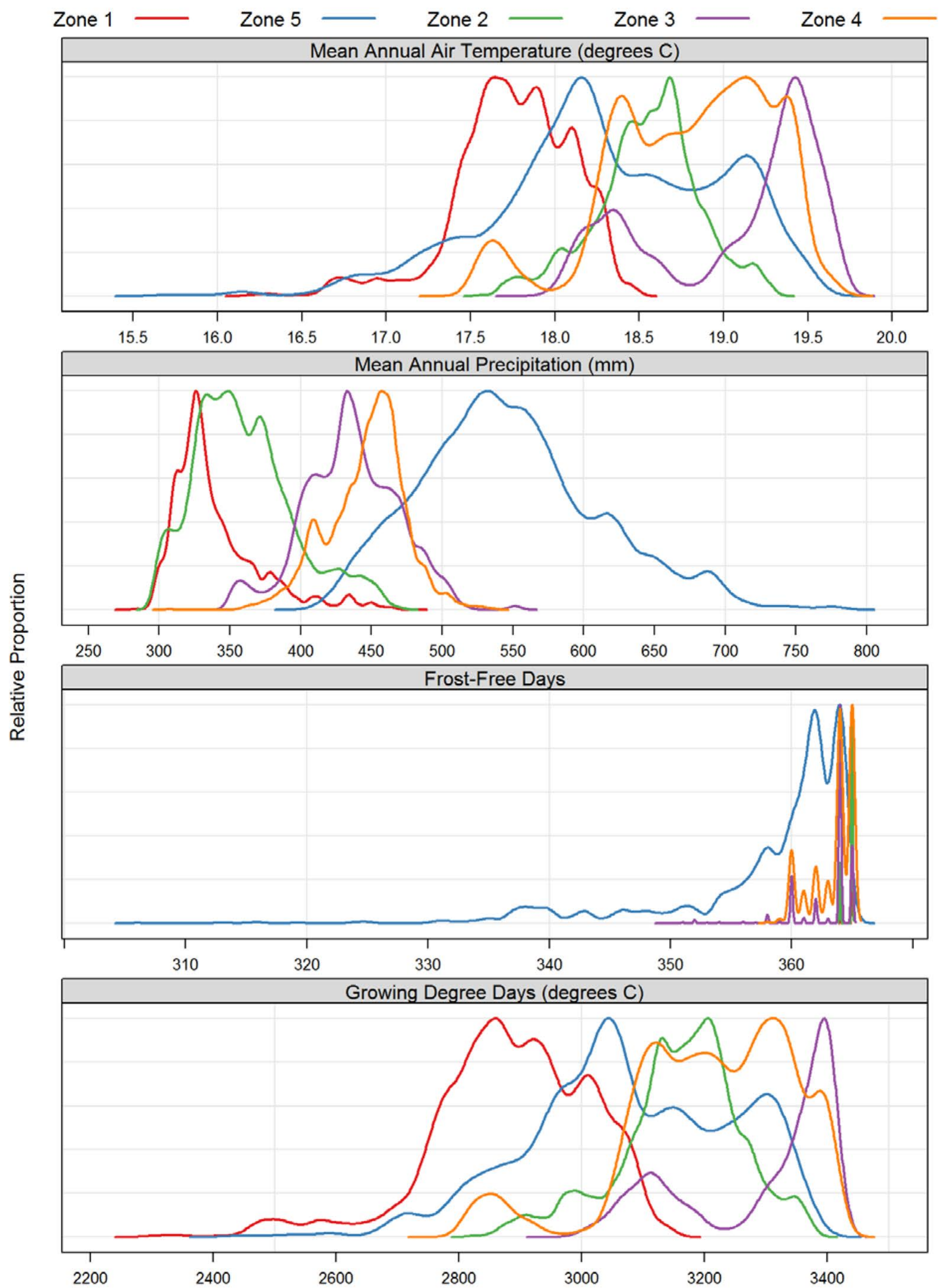
Table of Select Percentiles by Variable

(In this table, headings like “Q5” can be interpreted as the the “5th percentile,” or 5 percent of the data are less than this value. The 50th percentile [“Q50”] is the median.)

Climate Zone	Q5	Q10	Q25	Q50	Q75	Q90	Q95
Mean Annual Air Temperature (degrees C)							
1	17.12	17.39	17.57	17.78	18.01	18.19	18.27
2	17.99	18.14	18.38	18.57	18.73	18.92	19.05
3	18.15	18.25	18.54	19.29	19.45	19.57	19.62
4	17.77	18.27	18.46	18.86	19.19	19.39	19.43
5	17.18	17.43	17.92	18.25	18.85	19.18	19.29
Mean Annual Precipitation (mm)							
1	305	310	319	330	351	382	407
2	308	319	334	355	379	409	431
3	380	397	414	435	458	478	490
4	398	407	430	450	464	476	487
5	452	468	504	541	584	634	668
Frost-Free Days							
1	364	364	365	365	365	365	365
2	364	364	365	365	365	365	365
3	359	360	363	364	364	365	365
4	360	360	362	364	365	365	365
5	339	346	357	361	363	364	364
Growing Degree Days							
1	2,652	2,743	2,812	2,889	2,981	3,042	3,073
2	2,968	3,016	3,109	3,169	3,223	3,275	3,314
3	3,064	3,091	3,163	3,353	3,393	3,404	3,408
4	2,889	3,069	3,128	3,223	3,314	3,372	3,396
5	2,800	2,862	2,972	3,065	3,216	3,306	3,329

Density Plots

Density plots are a smooth alternative (density estimation) to the classic “binned” (histogram) approach to visualizing distributions. Peaks correspond to values that are most frequent within a data set. Each data set (ID / variable) is rescaled to {0,1} so that the y-axis can be interpreted as the “relative proportion of samples.”



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UNITED STATES DEPARTMENT OF AGRICULTURE

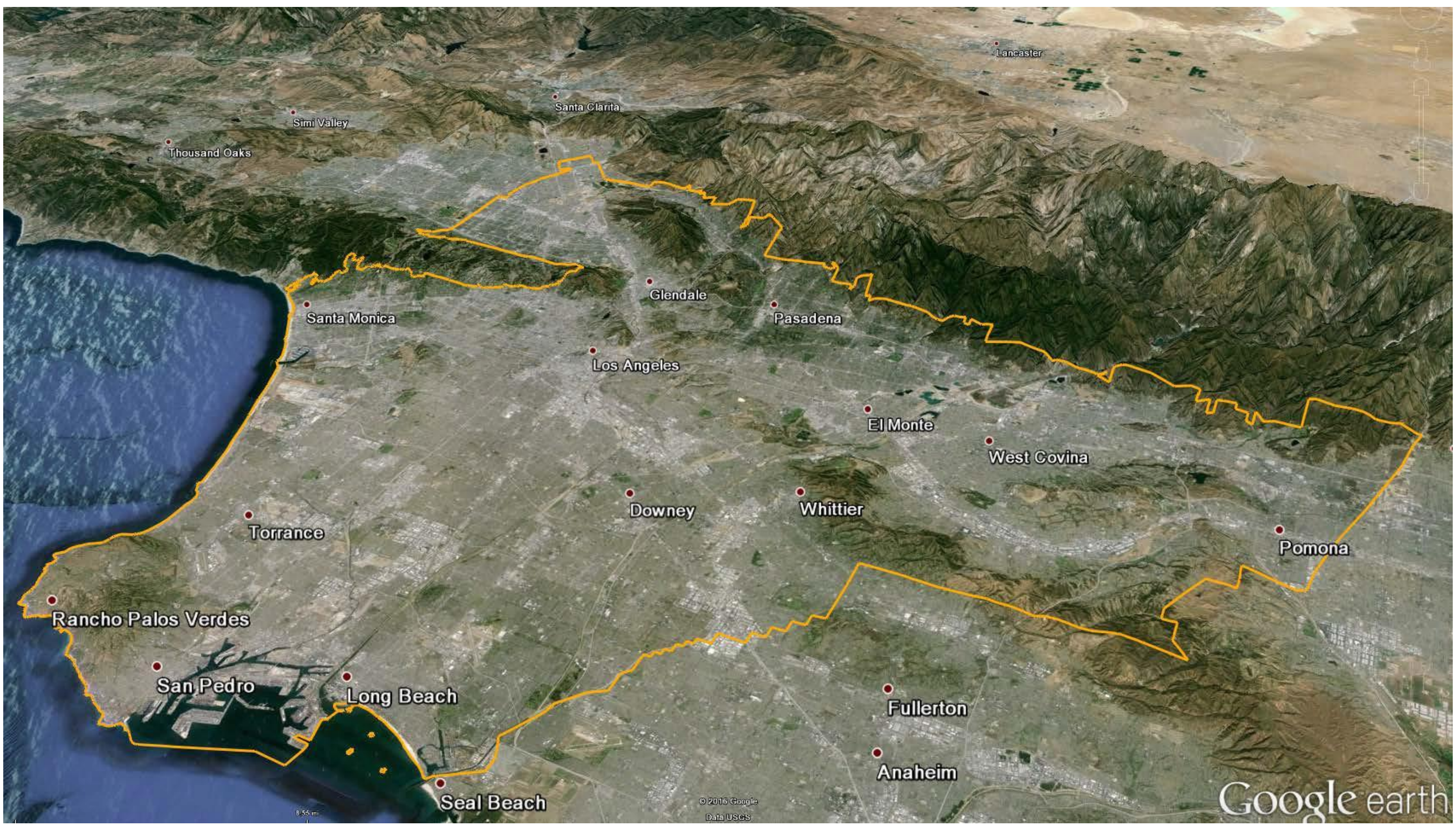
NATURAL RESOURCE CONSERVATION SERVICE

**(1) Classification and Correlation
of the Soils of**

Los Angeles County, California, Southeastern Part

CA696

June 30, 2016



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NATURAL RESOURCE CONSERVATION SERVICE

(1) Classification and Correlation of the Soils of

Los Angeles County, California, Southeastern Part

CA696

June 30, 2016

(2) Final Correlation document was prepared by Kit Paris, Soil Data Quality Specialist beginning on June 6, 2016 with assistance from Randy Riddle, Soil Survey Project Leader, Bev Harben, MLRASSO Project Leader, and Genevieve Landucci, Soil Scientist. The materials used for this correlation include results from progressive and final field reviews, the draft soil survey manuscript, field notes, laboratory data, new and revised official series descriptions, electronically stored pedon and map unit data in the National Soils Information System (NASIS) and digital maps generated in ArcGIS 10x.

Cover photo: Google Earth rendering of the Los Angeles soil survey area looking in from the southwest

(3) Head note for the Detailed Soil Survey Legend.

The field symbols were used as the publication symbols in this soil survey legend. The publication symbols consist of four digit numerical symbols starting at 1000 to 9999 and combination alphanumerical symbols with letter suffixes. Map units represented by four digit numerical symbols were initially developed during the mapping of the survey while the alphanumerical symbols indicate the polygons that were labeled to facilitate joining to adjacent surveys. The list is not consecutive. Water is represented by the Symbol "W."

(4) Field and Publication Names and Symbols

Soil Correlation of Los Angeles County, California, Southeastern Part:
Detailed Soil Map Legend

Field symbols	Field map unit name	Publication symbol	Approved map unit name
12af	Mollic Haploxeralfs, 2 to 50 percent slopes	12af	Mollic Haploxeralfs, 2 to 50 percent slopes
24af	Modesto, moderately deep-Trigo families complex, 25 to 75 percent slopes	24af	Modesto, moderately deep-Trigo families complex, 25 to 75 percent slopes
36af	Trigo, granitic substratum-Exchequer families-Rock outcrop complex, 60 to 100 percent slopes	36af	Trigo, granitic substratum-Exchequer families-Rock outcrop complex, 60 to 100 percent slopes
48af	Trigo-Modesto-San Andreas families association, 15 to 70 percent slopes	48af	Trigo-Modesto-San Andreas families association, 15 to 70 percent slopes
54af	Caperton-Trigo, granitic substratum-Lodo families complex, 50 to 85 percent slopes	54af	Caperton-Trigo, granitic substratum-Lodo families complex, 50 to 85 percent slopes
92af	Tollhouse-Stukel-Wrentham families complex, 60 to 90 percent slopes	92af	Tollhouse-Stukel-Wrentham families complex, 60 to 90 percent slopes
100oc	Alo clay, 9 to 15 percent slopes	100oc	Alo clay, 9 to 15 percent slopes
106oc	Anaheim loam, 15 to 30 percent slopes	106oc	Anaheim loam, 15 to 30 percent slopes
107oc	Anaheim loam, 30 to 50 percent slopes	107oc	Anaheim loam, 30 to 50 percent slopes
107sf	Capistrano-Urban land complex, 0 to 2 percent slopes	107sf	Capistrano-Urban land complex, 0 to 2 percent slopes
108sf	Capistrano-Urban land complex, 2 to 9 percent slopes	108sf	Capistrano-Urban land complex, 2 to 9 percent slopes
109oc	Anaheim clay loam, 30 to 50 percent slopes	109oc	Anaheim clay loam, 30 to 50 percent slopes
109sf	Chualar-Urban land complex, 2 to 9 percent slopes	109sf	Chualar-Urban land complex, 2 to 9 percent slopes
110sf	Conejo-Urban land complex, 0 to 2 percent slopes	110sf	Conejo-Urban land complex, 0 to 2 percent slopes
111sf	Conejo-Urban land complex, 2 to 9 percent slopes	111sf	Conejo-Urban land complex, 2 to 9 percent slopes
112oc	Balcom clay loam, 15 to 30 percent slopes	112oc	Balcom clay loam, 15 to 30 percent slopes
119oc	Blasingame-Rock outcrop complex, 9 to 30 percent slopes	119oc	Blasingame-Rock outcrop complex, 9 to 30 percent slopes
120sm	Mipolomol-Topanga association, 30 to 75 percent slopes	120sm	Mipolomol-Topanga association, 30 to 75 percent slopes
123oc	Bolsa silt loam, drained	123oc	Bolsa silt loam, drained
123sf	Mocho-Urban land complex, 0 to 2 percent slopes	123sf	Mocho-Urban land complex, 0 to 2 percent slopes

Field symbols	Field map unit name	Publication symbol	Approved map unit name
124sf	Mocho-Urban land complex, 2 to 9 percent slopes	124sf	Mocho-Urban land complex, 2 to 9 percent slopes
125oc	Bolsa silty clay loam, drained	125oc	Bolsa silty clay loam, drained
127sf	San Emigdio-Urban land complex, 0 to 2 percent slopes	127sf	San Emigdio-Urban land complex, 0 to 2 percent slopes
132sf	Soper gravelly sandy loam, 15 to 30 percent slopes	132sf	Soper gravelly sandy loam, 15 to 30 percent slopes
134oc	Calleguas clay loam, 50 to 75 percent slopes, eroded	134oc	Calleguas clay loam, 50 to 75 percent slopes, eroded
140oc	Chino silty clay loam, drained	140oc	Chino silty clay loam, drained
164oc	Metz loamy sand, moderately fine substratum	164oc	Metz loamy sand, moderately fine substratum
166oc	Mocho loam, 0 to 2 percent slopes, warm MAAT, MLRA 19	166oc	Mocho loam, 0 to 2 percent slopes, warm MAAT, MLRA 19
167oc	Mocho loam, 2 to 9 percent slopes	167oc	Mocho loam, 2 to 9 percent slopes
173oc	Myford sandy loam, 2 to 9 percent slopes	173oc	Myford sandy loam, 2 to 9 percent slopes
174oc	Myford sandy loam, 2 to 9 percent slopes, eroded	174oc	Myford sandy loam, 2 to 9 percent slopes, eroded
177oc	Myford sandy loam, 9 to 30 percent slopes, eroded	177oc	Myford sandy loam, 9 to 30 percent slopes, eroded
180oc	Nacimiento clay loam, 15 to 30 percent slopes	180oc	Nacimiento clay loam, 15 to 30 percent slopes, MLRA 20, warm MAAT
180oc	Nacimiento clay loam, 15 to 30 percent slopes, MLRA 20, warm MAAT	180oc	Nacimiento clay loam, 15 to 30 percent slopes, MLRA 20, warm MAAT
181oc	Nacimiento clay loam, 30 to 50 percent slopes, MLRA 20, warm MAAT	181oc	Nacimiento clay loam, 30 to 50 percent slopes, MLRA 20, warm MAAT
181oc	Nacimiento clay loam, 30 to 50 percent slopes	181oc	Nacimiento clay loam, 30 to 50 percent slopes, MLRA 20, warm MAAT
191oc	Riverwash	191oc	Riverwash
195oc	San Emigdio fine sandy loam, 2 to 9 percent slopes	195oc	San Emigdio fine sandy loam, 2 to 9 percent slopes
207oc	Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19	207oc	Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19
209oc	Sorrento clay loam, 2 to 9 percent slopes, warm MAAT, MLRA 19	209oc	Sorrento clay loam, 2 to 9 percent slopes, warm MAAT, MLRA 19
250sm	Urban land-Xerorthents, landscaped complex, 0 to 5 percent slopes	250sm	Urban land-Xerorthents, landscaped complex, 0 to 5 percent slopes
252sm	Urban land-Xerorthents, landscaped, complex, rarely flooded, 0 to 5 percent slopes	252sm	Urban land-Xerorthents, landscaped, complex, rarely flooded, 0 to 5 percent slopes
290sm	Topanga-Mipolomol-Sapwi association, 30 to 75 percent slopes	290sm	Topanga-Mipolomol-Sapwi association, 30 to 75 percent slopes
300af	Trigo, granitic substratum-Modjeska families association, 5 to 60 percent slopes	300af	Trigo, granitic substratum-Modjeska families association, 5 to 60 percent slopes
313af	Trigo family, granitic substratum, 60 to 90 percent slopes	313af	Trigo family, granitic substratum, 60 to 90 percent slopes
314af	Chilao-Trigo, granitic substratum-Lodo families complex, 55 to 85 percent slopes	314af	Chilao-Trigo, granitic substratum-Lodo families complex, 55 to 85 percent slopes
316af	Rock outcrop-Chilao family-Haploxerolls, warm association, 15 to 120 percent slopes	316af	Rock outcrop-Chilao family-Haploxerolls, warm association, 15 to 120 percent slopes

Field symbols	Field map unit name	Publication symbol	Approved map unit name
320af	Vista-Trigo, granitic substratum-Modesto families complex, 40 to 70 percent slopes	320af	Vista-Trigo, granitic substratum-Modesto families complex, 40 to 70 percent slopes
333af	Typic Xerorthents, warm, 55 to 90 percent slopes	333af	Typic Xerorthents, warm, 55 to 90 percent slopes
420af	Olete-Kilburn-Etsel families complex, 50 to 80 percent slopes	420af	Olete-Kilburn-Etsel families complex, 50 to 80 percent slopes
450sm	Sapwi loam, 30 to 75 percent slopes	450sm	Sapwi loam, 30 to 75 percent slopes
1000	Urban land-Hueneme, drained-San Emigdio complex, 0 to 2 percent slopes	1000	Urban land-Hueneme, drained-San Emigdio complex, 0 to 2 percent slopes
1001	Urban land-Metz-Pico complex, 0 to 2 percent slopes	1001	Urban land-Metz-Pico complex, 0 to 2 percent slopes
1002	Urban land-Palmview-Tujunga complex, 0 to 5 percent slopes	1002	Urban land-Palmview-Tujunga complex, 0 to 5 percent slopes
1003	Urban land-Palmview-Tujunga, gravelly complex, 2 to 9 percent slopes	1003	Urban land-Palmview-Tujunga, gravelly complex, 2 to 9 percent slopes
1004	Urban land-Puente(P)-Playorico(P)-complex, 0 to 2 percent slopes	1200	Urban land, commercial, 0 to 5 percent slopes
1004	Urban land-Puente(P)-Playorico(P)-complex, 0 to 2 percent slopes	1202	Urban land, 0 to 2 percent slopes
1005	Urban land-Biscailuz-Hueneme, drained complex, 0 to 2 percent slopes	1005	Urban land-Biscailuz-Hueneme, drained complex, 0 to 2 percent slopes
1006	Urban land-Soboba complex, 0 to 5 percent slopes	1006	Urban land-Soboba complex, 0 to 5 percent slopes
1007	Urban land-Biscailuz-Pico complex, 0 to 2 percent slopes	1007	Urban land-Biscailuz-Pico complex, 0 to 2 percent slopes
1008	Urban land-Pico-Metz complex, 0 to 2 percent slopes	1008	Urban land-Pico-Metz complex, 0 to 2 percent slopes
1009	Mocho-Garretson-San Emigdio complex, 2 to 9 percent slopes	167oc	Mocho loam, 2 to 9 percent slopes
1010	Cropley-Urban land complex, 0 to 5 percent slopes	1010	Cropley-Urban land complex, 0 to 5 percent slopes
1011	Urban land-Soboba-Tujunga complex, 5 to 15 percent slopes	1011	Urban land-Soboba-Tujunga complex, 5 to 15 percent slopes
1012	Urban land-Tujunga-Typic Xerorthents, sandy substratum complex, 0 to 2 percent slopes	1012	Urban land-Tujunga-Typic Xerorthents, sandy substratum complex, 0 to 2 percent slopes
1013	Urban land-Centinela-Typic Xerorthents, fine substratum complex, 0 to 2 percent slopes	1013	Urban land-Centinela-Typic Xerorthents, fine substratum complex, 0 to 2 percent slopes
1014	Urban land-Aquic Xerorthents, fine substratum-Cropley complex, 0 to 5 percent slopes	1014	Urban land-Aquic Xerorthents, fine substratum-Cropley complex, 0 to 5 percent slopes
1100	Urban land, 0 to 2 percent slopes, dredged fill substratum	1100	Urban land, 0 to 2 percent slopes, dredged fill substratum
1101	Urban land-Alfic Xerarents, fill-Typic Xerorthents, fill complex, 0 to 2 percent slopes	1100	Urban land, 0 to 2 percent slopes, dredged fill substratum
1102	Urban land-Xerorthents, dredged spoil complex, 0 to 2 percent slopes	1100	Urban land, 0 to 2 percent slopes, dredged fill substratum
1103	Urban land-Aquic Xerorthents-Xerorthents, dredged spoil complex, 0 to 2 percent slopes	1103	Urban land-Aquic Xerorthents-Xerorthents, dredged spoil complex, 0 to 2 percent slopes
1104	Urban land-Aquic Xerorthents, graded-Pacheco, warm complex, 0 to 2 percent slopes	1104	Urban land-Aquic Xerorthents, graded-Pacheco, warm complex, 0 to 2 percent slopes

Field symbols	Field map unit name	Publication symbol	Approved map unit name
1106	Urban land, commercial-Soboba complex, 0 to 5 percent slopes	1106	Urban land, commercial-Soboba complex, 0 to 5 percent slopes
1111	Xerorthents, fill consociation, 0 to 45 percent slopes	1232	Counterfeit-Urban land complex, 10 to 35 percent slopes, terraced
1112	Urban land-Xerorthents, fill complex, 0 to 45 percent slopes	1232	Counterfeit-Urban land complex, 10 to 35 percent slopes, terraced
1118	Longshore-Pachic Haploxerolls complex, 20 to 55 percent slopes	1118	Longshore-Pachic Haploxerolls complex, 20 to 55 percent slopes
1119	Urban land-Sepulveda-Longshore, graded complex, 3 to 12 percent slopes	1119	Urban land-Sepulveda-Longshore, graded complex, 3 to 12 percent slopes
1120	Typic Xerorthents, terraced-Topanga-Urban land complex, 20 to 75 percent slopes	1120	Typic Xerorthents, terraced-Topanga-Urban land complex, 20 to 75 percent slopes
1121	Urban land-Sepulveda-Pierview complex, 2 to 12 percent slopes	1121	Urban land-Sepulveda-Pierview complex, 2 to 12 percent slopes
1122	Urban land-Pierview complex, 0 to 5 percent slopes	1122	Urban land-Pierview complex, 0 to 5 percent slopes
1123	Urban land-Abaft-Mollic Haploxeralfs complex, 2 to 5 percent slopes	1154	Urban land-Marina complex, 0 to 5 percent slopes
1124	Urban land-Windfetch-Centinela complex, 0 to 5 percent slopes	1124	Urban land-Windfetch-Centinela complex, 0 to 5 percent slopes
1125	Urban land-Typic Xerorthents, terraced-Windfetch complex, 2 to 9 percent slopes	1125	Urban land-Typic Xerorthents, terraced-Windfetch complex, 2 to 9 percent slopes
1126	Urban land-Haploxeralfs complex, 0 to 2 percent slopes	1126	Urban land-Haploxeralfs complex, 0 to 2 percent slopes
1128	Urban land-Anthraltic Xerorthents, loamy substratum-Grommet complex, 0 to 5 percent slopes	1128	Urban land-Anthraltic Xerorthents, loamy substratum-Grommet complex, 0 to 5 percent slopes
1129	Urban land-Grommet-Ballona complex, 0 to 5 percent slopes	1129	Urban land-Grommet-Ballona complex, 0 to 5 percent slopes
1130	Urban land-Windfetch-Typic Haploxerolls complex, 0 to 2 percent slopes	1130	Urban land-Windfetch-Typic Haploxerolls complex, 0 to 2 percent slopes
1131	Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 0 to 5 percent slopes	1131	Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 0 to 5 percent slopes
1132	Urban land-Thums-Windfetch complex, 0 to 5 percent slopes	1132	Urban land-Thums-Windfetch complex, 0 to 5 percent slopes
1133	Urban land-Thums-Windfetch complex, 0 to 2 percent slopes	1133	Urban land-Thums-Windfetch complex, 0 to 2 percent slopes
1134	Urban land-Thums-Pierview complex, 0 to 5 percent slopes	1134	Urban land-Thums-Pierview complex, 0 to 5 percent slopes
1135	Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 5 to 15 percent slopes	1135	Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 5 to 15 percent slopes
1136	Urban land-Sorrento-Arbolado complex, 2 to 9 percent slopes	1136	Urban land-Sorrento-Arbolado complex, 2 to 9 percent slopes
1137	Urban land-Ballona-Typic Xerorthents, fine substratum complex, 0 to 5 percent slopes	1137	Urban land-Ballona-Typic Xerorthents, fine substratum complex, 0 to 5 percent slopes
1138	Urban land-Azuvina-Montebello complex, 0 to 5 percent slopes	1138	Urban land-Azuvina-Montebello complex, 0 to 5 percent slopes
1139	Urban land-Xerorthents, terraced-Centinela complex, 2 to 9 percent slopes	1139	Urban land-Xerorthents, terraced-Centinela complex, 2 to 9 percent slopes

Field symbols	Field map unit name	Publication symbol	Approved map unit name
1140	Apollo, warm-Calleguas complex, 20 to 65 percent slopes	1140	Apollo, warm-Calleguas complex, 20 to 65 percent slopes
1141	Zaca-Apollo, warm complex, 20 to 55 percent slopes	1141	Zaca-Apollo, warm complex, 20 to 55 percent slopes
1142	Nacimiento-Altamont complex, 55 to 75 percent slope	1141	Zaca-Apollo, warm complex, 20 to 55 percent slopes
1143	Soper-Pachic Haploxerolls-Boades complex, 25 to 75 percent slopes	1143	Soper-Pachic Haploxerolls-Boades complex, 25 to 75 percent slopes
1144	Soper-Buzzpeak association, 35 to 75 percent slopes	1143	Soper-Pachic Haploxerolls-Boades complex, 25 to 75 percent slopes
1144	Soper-Buzzpeak association, 35 to 75 percent slopes	1144	Soper-Buzzpeak association, 35 to 75 percent slopes
1145	Gaviota-Chumash-Rock outcrop complex, 20 to 55 percent slopes	1145	Gaviota-Chumash-Rock outcrop complex, 20 to 55 percent slopes
1146	Lithic Haploxerolls-Lithic Argixerolls complex, 20 to 55 percent slopes	1146	Lithic Haploxerolls-Lithic Argixerolls complex, 20 to 55 percent slopes
1147	Vista-Cieneba complex, 30 to 85 percent slopes	1147	Vista-Cieneba complex, 30 to 85 percent slopes
1148	Vista-Fallbrook-Cieneba complex, 30 to 75 percent slopes	1148	Vista-Fallbrook-Cieneba complex, 30 to 75 percent slopes
1149	Balcom-Nacimiento, warm complex, 30 to 75 percent slopes	1149	Balcom-Nacimiento, warm complex, 30 to 75 percent slopes
1150	Abaft-Beaches complex, 0 to 5 percent slopes	1150	Abaft-Beaches complex, 0 to 5 percent slopes
1151	Urban land-Abaft complex, 0 to 5 percent slopes	1151	Urban land-Abaft complex, 0 to 5 percent slopes
1152	Urban land-Abaft-Marina complex, 0 to 15 percent slopes	1152	Urban land-Abaft-Marina complex, 0 to 15 percent slopes
1153	Urban land-Abaft, loamy surface complex, 5 to 30 percent slopes, terraced	1153	Urban land-Abaft, loamy surface complex, 5 to 30 percent slopes, terraced
1154	Urban land-Marina complex, 0 to 5 percent slopes	1154	Urban land-Marina complex, 0 to 5 percent slopes
1155	Beaches, rocky	1155	Beaches, rocky
1160	Padova-Walong complex, 30 to 85 percent slopes	1160	Padova-Walong complex, 30 to 85 percent slopes
1161	Osito-Kawenga association, 20 to 65 percent slopes	1161	Osito-Kawenga association, 20 to 65 percent slopes
1162	Cotharin-Rock outcrop complex, 30 to 75 percent slopes	1162	Cotharin-Rock outcrop complex, 30 to 75 percent slopes
1163	Urban land-Xerorthents-Osito complex, 10 to 35 percent slopes	1163	Urban land-Xerorthents-Osito complex, 10 to 35 percent slopes
1164	Anaheim-Soper complex, 20 to 55 percent slopes	1164	Anaheim-Soper complex, 20 to 55 percent slopes
1168	Haploxerepts, 10 to 35 percent slopes	1168	Haploxerepts, 10 to 35 percent slopes
1169	Lunada-San Benito, warm complex, 30 to 75 percent slopes	1169	Lunada-San Benito, warm complex, 30 to 75 percent slopes
1170	Urban land-Windfetch-Sepulveda complex, 2 to 9 percent slopes	1170	Urban land-Windfetch-Sepulveda complex, 2 to 9 percent slopes
1171	Urban land-Dapplegray-Vertic Calcixerolls complex, 3 to 12 percent slopes	1171	Urban land-Dapplegray-Vertic Calcixerolls complex, 3 to 12 percent slopes
1172	Lunada-Zaca complex, 30 to 75 percent slopes	1172	Lunada-Zaca complex, 30 to 75 percent slopes

Field symbols	Field map unit name	Publication symbol	Approved map unit name
1173	Urban land-Dapplegray-Oceanaire complex, 10 to 35 percent slopes	1173	Urban land-Dapplegray-Oceanaire complex, 10 to 35 percent slopes
1174	Calcic Haploxerepts-Longshore-Urban land complex, 10 to 35 percent slopes	1174	Calcic Haploxerepts-Longshore-Urban land complex, 10 to 35 percent slopes
1175	Urban land-Filiorum complex, 2 to 9 percent slopes	1175	Urban land-Filiorum complex, 2 to 9 percent slopes
1176	Urban land-Dapplegray-Filiorum, deep complex, 5 to 15 percent slopes	1176	Urban land-Dapplegray-Filiorum, deep complex, 5 to 15 percent slopes
1177	Mollic Haploxeralfs-Topdeck-Urban land complex, 20 to 55 percent slopes	1177	Mollic Haploxeralfs-Topdeck-Urban land complex, 20 to 55 percent slopes
1178	Oceanaire-Filiorum complex, 10 to 35 percent slopes	1178	Oceanaire-Filiorum complex, 10 to 35 percent slopes
1179	Zaca-Ballast complex, 10 to 50 percent slopes	1179	Zaca-Ballast complex, 10 to 50 percent slopes
1180	Pits and Quarries	1180	Pits and Quarries
1200	Urban land, commercial, 0 to 5 percent slopes	1200	Urban land, commercial, 0 to 5 percent slopes
1201	Urban land, commercial, 5 to 35 percent slopes	1201	Urban land, commercial, 5 to 35 percent slopes
1202	Urban land, 0 to 2 percent slopes	1202	Urban land, 0 to 2 percent slopes
1205	Urban land-Typic Xerorthents, calcareous substratum, 0 to 5 percent slopes	1205	Urban land-Typic Xerorthents, calcareous substratum, 0 to 5 percent slopes
1210	Urban land-Montebello-Xerorthents complex, 0 to 15 percent slopes, terraced	1210	Urban land-Montebello-Xerorthents complex, 0 to 15 percent slopes, terraced
1218	Urban land-Typic Xerorthents, terraced complex, 10 to 35 percent slopes	1218	Urban land-Typic Xerorthents, terraced complex, 10 to 35 percent slopes
1221	Urban land-Sepulveda complex, 2 to 12 percent slopes	1221	Urban land-Sepulveda complex, 2 to 12 percent slopes
1230	Bolsa, drained-Typic Xerorthents, dredged spoil-Typic Fluvaquents complex, 0 to 2 percent slopes	1230	Bolsa, drained-Typic Xerorthents, dredged spoil-Typic Fluvaquents complex, 0 to 2 percent slopes
1231	Urban land-Typic Xerorthents, dredged spoil complex, 0 to 2 percent slopes	1231	Urban land-Typic Xerorthents, dredged spoil complex, 0 to 2 percent slopes
1232	Counterfeit-Urban land complex, 10 to 35 percent slopes, terraced	1232	Counterfeit-Urban land complex, 10 to 35 percent slopes, terraced
1233	Typic Fluvaquents-Typic Xerorthents, dredged spoil complex, 0 to 1 percent slopes	1233	Typic Fluvaquents-Typic Xerorthents, dredged spoil complex, 0 to 1 percent slopes
1234	Xerorthents, 15 to 35 percent slopes, graded internment areas	250sm	Urban land-Xerorthents, landscaped complex, 0 to 5 percent slopes
1234	Xerorthents, 15 to 35 percent slopes, graded internment areas	1119	Urban land-Sepulveda-Longshore, graded complex, 3 to 12 percent slopes
1234	Xerorthents, 15 to 35 percent slopes, graded internment areas	1163	Urban land-Xerorthents-Osito complex, 10 to 35 percent slopes
1234	Xerorthents, 15 to 35 percent slopes, graded internment areas	1232	Counterfeit-Urban land complex, 10 to 35 percent slopes, terraced

Field symbols	Field map unit name	Publication symbol	Approved map unit name
1235	Urban land-Typic Xerorthents, coarse-Vista complex, 10 to 35 percent slopes	1235	Urban land-Typic Xerorthents, coarse-Vista complex, 10 to 35 percent slopes
1238	Urban land-Montebello complex, 0 to 5 percent slopes	1238	Urban land-Montebello complex, 0 to 5 percent slopes
1240	Urban land-Dapplegray complex, 5 to 20 percent slopes	1240	Urban land-Dapplegray complex, 5 to 20 percent slopes
1241	Counterfeit-Nacimiento, warm-Urban land association, 20 to 55 percent slopes	1241	Counterfeit-Nacimiento, warm-Urban land association, 20 to 55 percent slopes
1242	Urban land-Dapplegray-Soper complex, 20 to 55 percent slopes	1242	Urban land-Dapplegray-Soper complex, 20 to 55 percent slopes
1243	Typic Haploxerepts-Pachic Argixerolls-Urban land complex, 15 to 35 percent slopes	1143	Soper-Pachic Haploxerolls-Boades complex, 25 to 75 percent slopes
1244	Urban land-Tujunga-Typic Xerorthents complex, 3 to 15 percent slopes, terraced	1143	Soper-Pachic Haploxerolls-Boades complex, 25 to 75 percent slopes
1244	Urban land-Tujunga-Typic Xerorthents complex, 3 to 15 percent slopes, terraced	1144	Soper-Buzzpeak association, 35 to 75 percent slopes
1249	Urban land-Balcom-Typic Xerorthents, landscaped complex, 10 to 60 percent slopes	1249	Urban land-Balcom-Typic Xerorthents, landscaped complex, 10 to 60 percent slopes
1260	Water, open no anthropogenic liner	W	Water
1261	Urban land, frequently flooded, 0 to 5 percent slopes	1261	Urban land, frequently flooded, 0 to 5 percent slopes
1264	Xeropsamments, frequently flooded, 0 to 2 percent slopes	1264	Xeropsamments, frequently flooded, 0 to 2 percent slopes
1265	Tujunga sand, frequently flooded, 0 to 1 percent slopes	1180	Pits and Quarries
1266	Soboba and Tujunga soils, 0 to 5 percent slopes, frequently flooded	1266	Soboba and Tujunga soils, 0 to 5 percent slopes, frequently flooded
1267	Urban land-Cumulic Haploxerolls complex, 2 to 9 percent slopes	1267	Urban land-Cumulic Haploxerolls complex, 2 to 9 percent slopes
1270	Urban land-Typic Xerorthents, calcareous complex, 0 to 5 percent slopes	1270	Urban land-Typic Xerorthents, calcareous complex, 0 to 5 percent slopes
1271	Urban land-Dapplegray complex, 5 to 20 percent slopes, terraced	1271	Urban land-Dapplegray complex, 5 to 20 percent slopes, terraced
1272	Dapplegray-Urban land complex, 10 to 35 percent slopes, terraced	1272	Dapplegray-Urban land complex, 10 to 35 percent slopes, terraced
1273	Dapplegray-Urban land-Lunada complex, 20 to 55 percent slopes	1273	Dapplegray-Urban land-Lunada complex, 20 to 55 percent slopes
1280	Dumps	1280	Dumps
1400	Urban land-Xerofluvents complex, 0 to 5 percent slopes, residential	1000	Urban land-Hueneme, drained-San Emigdio complex, 0 to 2 percent slopes
9996	Rock outcrop, marine terrace escarpments	9996	Rock outcrop, marine terrace escarpments
9997	Mined land, oil wells	9997	Mined land, oil wells
9999	Urban land, industrial	9999	Urban land, industrial
CkCsb	Chualar clay loam, 2 to 9 percent slopes	CkCsb	Chualar clay loam, 2 to 9 percent slopes
DAM	Dams	DAM	Dams
FoFsb	Fontana clay loam, 30 to 50 percent slopes	FoFsb	Fontana clay loam, 30 to 50 percent slopes
GaCsb	Garretson very fine sandy loam, 2 to 9 percent slopes	GaCsb	Garretson very fine sandy loam, 2 to 9 percent slopes

Field symbols	Field map unit name	Publication symbol	Approved map unit name
Hrsb	Hilmar loamy fine sand	Hrsb	Hilmar loamy fine sand
NaEsb	Nacimiento clay loam, 9 to 30 percent slopes, MLRA 20, warm MAAT	NaEsb	Nacimiento clay loam, 9 to 30 percent slopes, MLRA 20, warm MAAT
SpCsb	Soboba stony loamy sand, 2 to 9 percent slopes	SpCsb	Soboba stony loamy sand, 2 to 9 percent slopes
StBsb	Sorrento clay loam, 2 to 5 percent slopes	StBsb	Sorrento clay loam, 2 to 5 percent slopes
TuBsb	Tujunga loamy sand, 0 to 5 percent slopes	TuBsb	Tujunga loamy sand, 0 to 5 percent slopes
W	Water	W	Water

(5) Series to be established by this correlation.

Series Name	Remarks
Arbolado	Entic Haploxerolls, graded complex, was correlated to a new series Arbolado.
Azuvina	New series developed to accomodate the component that was borne from the Botella.
Ballona	Calcic Pachic Haploxerolls correlated to new series, Ballona.
Biscailuz	Biscailuz is set up as a new series. It was developed from a "Chino" drained taxajunct. All low lying, historically wet areas are now drained due to flood controls. Biscailuz is a drained concept series.
Buzzpeak	Buzzpeak was set up as a new series as there is enough documentation and support and no other series will fit.
Centinela	Centinela was set up as a new series to update the Fine, smectitic, thermic Vertic Haploxerepts after sufficient documentation was obtained.
Dapplegray	Typic Xerorthents, graded marine terraces correlated to the new Dapplgray series at the Final Correlation for CA696.
Filiorum	Deep Aridic Haploxerts in 1173 have been correlated to a new series named Filiorum, deep.
Grommet	Grommet is established as a new Series in place of Salinas which is a marginal correlation in LA
Longshore	Typic Argixerolls updated to new Longshore series. Replaces higher category soils in the Baldwin Hills as was the suggestion at previous reviews and assists. Being non-carbonatic competes it out of other series
Lunada	Lunada was proposed as a new series to replace the higher category Typic Calcixerepts components
Montebello	The soil originally representing Montebello was presented at 2011 Field assist as a Fi-Lo Typic Xerorthents, a Botella with >50cm HTM, graded material on the surface. At a later date the new Montebello series proposal was viewed as a better alternative.
Oceanaire	Oceanaire was proposed for a new series from mapping on the Palos Verdes Penninsula
Padova	Padova was proposed in 2010 for mapping in the Claremont Hills and has held up through continued scrutiny
Palmview	The Palmview Series was observed at the progress field review in 2010 and was agreed to have it proposed
Pierview	Pierview set up for the Mollic Palexeralfs after the 2014 Field Assistance
Sepulveda	New proposed series "Sepulveda" for the Anthraltic Xerorthents in mapunit 1121 and naturally applied to other similar components.
Thums	After long soul searching and several convulsions which produced other mapunit components, finally a more finite Thums has emerged so a new series is proposed.
Windfetch	Could not correlate to existing series. Closest was Ballard which is slightly acidic and gravelly. This component is neither. Therefore the Windfetch was split out.

(6) Series dropped or made inactive

These are the proposed but never established Ahwinga, Crias, Paramount and Playorico component names. These names will be discontinued.

(7) Cooperators' Names and Credits.

United States Department of Agriculture Natural Resources Conservation Service in cooperation with the Santa Monica Mountains Resource Conservation District; and the State of California, Department of Conservation.

This survey was made for the National Cooperative Soil Survey, by the United States Department of Agriculture, Natural Resources Conservation Services in cooperation with the Santa Monica Mountains Resource Conservation District; the Foundation for Pierce College and Pierce College Farm Center and the State of California, Department of Conservation.

This survey is part of the Field Office Technical Guide for the NRCS Lancaster Field Office.

Credits to be given on page ii of the published soil survey are as follows:

This survey was made for the National Cooperative Soil Survey,
by the United States Department of Agriculture,
Natural Resources Conservation Services;
State of California, Department of Conservation;
Santa Monica Mountains Resource Conservation District;
The Foundation for Pierce College and Pierce College Farm Center.
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We would like to thank the following agencies, organizations and cities of southern California for providing permission to access lands and areas that were essential to the making of this survey.

Army Corps of Engineers
Baldwin Hills Conservancy
Burbank Unified School District
California Coastal Commission
California State Parks
California State University Pomona (CalPoly)
Hacienda La Puente Unified School District
Los Angeles Department of Recreation and Parks
Los Angeles Unified School District
Los Angeles World Airports
Montebello Unified School District

Palos Verdes Land Conservancy
Punete Hills Habitat Preservation Authority
Rivers and Mountains Conservancy
Santa Monica Mountains Conservancy

Cities or municipalities:
Azusa
Baldwin Park
Beverly Hills
Carson
Cerritos
City of Industry
Compton
Covina
Culver City
Diamond Bar
Duarte
El Monte
El Segundo
Gardena
Glendora
Hawthorne
Inglewood
La Canada-Flintridge
La Mirada
La Puente
La Verne
Lakewood
Lawndale
Lomita
Long Beach
Los Angeles
Manhattan Beach
Montebello
Monterey Park
Norwalk
Palos Verdes Estates
Pasadena
Pico Rivera
Pomona
Rancho Palos Verdes
Redondo Beach
Redondo Beach
Rolling Hills
Rolling Hills Estates
Rosemead
San Dimas
Santa Fe Springs
Santa Monica
Sierra Madre
Signal Hill
South El Monte
South Pasadena
Temple city
Torrance
Walnut
West Covina
West Hollywood
Whittier

(8) Prior Soil Survey Publications

Name	Year Published	Authors:
Reconnaissance Soil Survey of the Gabriel River Basin, California	1972	SCS
Report and General Soils Map of Los Angeles County	1969	SCS
Reconnaissance Soil Survey of the Central Southern Area, California	1917, printed 1921	Bureau of Soils
Soil Survey of the Los Angeles Area, California	1916, printed 1919	Bureau of Soils
Soil Survey of the San Fernando Valley Area, California	1915, printed 1917	Bureau of Soils
Soil Survey of the Pasadena Area, California	1915, printed 1917	Bureau of Soils
Soil Survey of the Anaheim Area, California	1916, printed 1919	Bureau of Soils

(9) Miscellaneous Items.

None noted

(10) Instructions for Map Compilation, Map Finishing, and Digitizing.

Map compilation was completed by NRCS using on-screen digitizing using ArcGIS 10.1 software. Map certification will be completed by a NRCS-Digitizing Unit using current SSURGO procedures and procedures for map compilation were followed as specified in the National Soil Survey Handbook, Part 647, 2012.

Some features will be labeled only. The source for the cultural and drainage features is USGS Topographic Quads.

Map compilation and on-screen digitizing was initially done by Randy Riddle and Matthew Ballmer using current SSURGO procedures. Final digitizing edits have been completed by Randy Riddle, with assistance from Bev Harben and Kit Paris.

The base map used for geodatabase compilation is:

2010 NAIP Natural Color Imagery for California acquired between April 24, 2010 and October 10, 2010. Source; APFO server.
Data Type: ArcGIS Image Service
Service Name: NAIP\California\CA_2010_1m_NC
AIS Service URL:
ImageService://imagery.apfo.usda.gov:3982/NAIP/California/CA_2010_1m_NC
Data Representation Type: RGB Color aerial Orthophotography
Scale: 1:24000

Other digital imagery and datasets used:

Digital Elevation Data – used as supplement to NAIP imagery in urban setting
Data Type: ArcGIS Image Service
Service Name: USAHillshade10m
AIS Service URL:
ImageService://imageserver1.ftw.nrcs.usda.gov:10010/USAHillshade10m
Data Representation Type: Generic
2005
IDAR LAR-IAC 3 Meter Digital Elevation Model (DEM)

(11) Conventional and Special Symbols Legend.

SEE ATTACHED 37A

(12) General Soil Map Units.

A general soils map will be developed from the SSURGO data at a publishable scale as soon as the maps are digitized.

(13) Conversion Legend.

There is no conversion legend for this survey because the field mapping symbols are the same as the publication symbols**.**

(14a) Legend of Map Units in Alphabetical Sequence.

ALPHABETICAL WORKING LEGEND

Map symbol	Map unit name
1150	Abaft-Beaches complex, 0 to 5 percent slopes
100oc	Alo clay, 9 to 15 percent slopes
109oc	Anaheim clay loam, 30 to 50 percent slopes
106oc	Anaheim loam, 15 to 30 percent slopes
107oc	Anaheim loam, 30 to 50 percent slopes
1164	Anaheim-Soper complex, 20 to 55 percent slopes
1140	Apollo, warm-Calleguas complex, 20 to 65 percent slopes
112oc	Balcom clay loam, 15 to 30 percent slopes
1149	Balcom-Nacimiento, warm complex, 30 to 75 percent slopes
1155	Beaches, rocky
119oc	Blasingame-Rock outcrop complex, 9 to 30 percent slopes
123oc	Bolsa silt loam, drained
125oc	Bolsa silty clay loam, drained
1230	Bolsa, drained-Typic Xerorthents, dredged spoil-Typic Fluvaquents complex, 0 to 2 percent slopes
1174	Calcic Haploxerepts-Longshore-Urban land complex, 10 to 35 percent slopes
134oc	Calleguas clay loam, 50 to 75 percent slopes, eroded
54af	Caperton-Trigo, granitic substratum-Lodo families complex, 50 to 85 percent slopes
107sf	Capistrano-Urban land complex, 0 to 2 percent slopes
108sf	Capistrano-Urban land complex, 2 to 9 percent slopes
314af	Chilao-Trigo, granitic substratum-Lodo families complex, 55 to 85 percent slopes
140oc	Chino silty clay loam, drained
CkCsb	Chualar clay loam, 2 to 9 percent slopes
109sf	Chualar-Urban land complex, 2 to 9 percent slopes
110sf	Conejo-Urban land complex, 0 to 2 percent slopes
111sf	Conejo-Urban land complex, 2 to 9 percent slopes
1162	Cotharin-Rock outcrop complex, 30 to 75 percent slopes
1241	Counterfeit-Nacimiento, warm-Urban land association, 20 to 55 percent slopes
1232	Counterfeit-Urban land complex, 10 to 35 percent slopes, terraced
1010	Cropley-Urban land complex, 0 to 5 percent slopes
DAM	Dams
1272	Dapplegray-Urban land complex, 10 to 35 percent slopes, terraced
1273	Dapplegray-Urban land-Lunada complex, 20 to 55 percent slopes
1280	Dumps
FoFsb	Fontana clay loam, 30 to 50 percent slopes
GaCsb	Garretson very fine sandy loam, 2 to 9 percent slopes
1145	Gaviota-Chumash-Rock outcrop complex, 20 to 55 percent slopes
1168	Haploxerepts, 10 to 35 percent slopes
Hrsb	Hilmar loamy fine sand
1146	Lithic Haploxerolls-Lithic Argixerolls complex, 20 to 55 percent slopes
1118	Longshore-Pachic Haploxerolls complex, 20 to 55 percent slopes
1169	Lunada-San Benito, warm complex, 30 to 75 percent slopes
1172	Lunada-Zaca complex, 30 to 75 percent slopes
164oc	Metz loamy sand, moderately fine substratum
9997	Mined land, oil wells
120sm	Mipolomol-Topanga association, 30 to 75 percent slopes

Map symbol	Map unit name
166oc	Mocho loam, 0 to 2 percent slopes, warm MAAT, MLRA 19
167oc	Mocho loam, 2 to 9 percent slopes
123sf	Mocho-Urban land complex, 0 to 2 percent slopes
124sf	Mocho-Urban land complex, 2 to 9 percent slopes
24af	Modesto, moderately deep-Trigo families complex, 25 to 75 percent slopes
12af	Mollic Haploxeralfs, 2 to 50 percent slopes
1177	Mollic Haploxeralfs-Topdeck-Urban land complex, 20 to 55 percent slopes
173oc	Myford sandy loam, 2 to 9 percent slopes
174oc	Myford sandy loam, 2 to 9 percent slopes, eroded
177oc	Myford sandy loam, 9 to 30 percent slopes, eroded
180oc	Nacimiento clay loam, 15 to 30 percent slopes, MLRA 20, warm MAAT
181oc	Nacimiento clay loam, 30 to 50 percent slopes, MLRA 20, warm MAAT
NaEsb	Nacimiento clay loam, 9 to 30 percent slopes, MLRA 20, warm MAAT
1178	Oceanaire-Filiorum complex, 10 to 35 percent slopes
420af	Olete-Kilburn-Etsel families complex, 50 to 80 percent slopes
1161	Osito-Kawenga association, 20 to 65 percent slopes
1160	Padova-Walong complex, 30 to 85 percent slopes
1180	Pits and Quarries
191oc	Riverwash
9996	Rock outcrop, marine terrace escarpments
316af	Rock outcrop-Chilao family-Haploxerolls, warm association, 15 to 120 percent slopes
195oc	San Emigdio fine sandy loam, 2 to 9 percent slopes
127sf	San Emigdio-Urban land complex, 0 to 2 percent slopes
450sm	Sapwi loam, 30 to 75 percent slopes
1266	Soboba and Tujunga soils, 0 to 5 percent slopes, frequently flooded
SpCsb	Soboba stony loamy sand, 2 to 9 percent slopes
132sf	Soper gravelly sandy loam, 15 to 30 percent slopes
1144	Soper-Buzzpeak association, 35 to 75 percent slopes
1143	Soper-Pachic Haploxerolls-Boades complex, 25 to 75 percent slopes
StBsb	Sorrento clay loam, 2 to 5 percent slopes
209oc	Sorrento clay loam, 2 to 9 percent slopes, warm MAAT, MLRA 19
207oc	Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19
92af	Tollhouse-Stukel-Wrentham families complex, 60 to 90 percent slopes
290sm	Topanga-Mipolomol-Sapwi association, 30 to 75 percent slopes
313af	Trigo family, granitic substratum, 60 to 90 percent slopes
36af	Trigo, granitic substratum-Exchequer families-Rock outcrop complex, 60 to 100 percent slopes
300af	Trigo, granitic substratum-Modjeska families association, 5 to 60 percent slopes
48af	Trigo-Modesto-San Andreas families association, 15 to 70 percent slopes
TuBsb	Tujunga loamy sand, 0 to 5 percent slopes
1233	Typic Fluvaquents-Typic Xerorthents, dredged spoil complex, 0 to 1 percent slopes
1120	Typic Xerorthents, terraced-Topanga-Urban land complex, 20 to 75 percent slopes
333af	Typic Xerorthents, warm, 55 to 90 percent slopes
1202	Urban land, 0 to 2 percent slopes
1100	Urban land, 0 to 2 percent slopes, dredged fill substratum

Map symbol	Map unit name
1200	Urban land, commercial, 0 to 5 percent slopes
1201	Urban land, commercial, 5 to 35 percent slopes
1106	Urban land, commercial-Soboba complex, 0 to 5 percent slopes
1261	Urban land, frequently flooded, 0 to 5 percent slopes
9999	Urban land, industrial
1151	Urban land-Abaft complex, 0 to 5 percent slopes
1153	Urban land-Abaft, loamy surface complex, 5 to 30 percent slopes, terraced
1152	Urban land-Abaft-Marina complex, 0 to 15 percent slopes
1128	Urban land-Anthraltic Xerorthents, loamy substratum-Grommet complex, 0 to 5 percent slopes
1014	Urban land-Aquic Xerorthents, fine substratum-Cropley complex, 0 to 5 percent slopes
1104	Urban land-Aquic Xerorthents, graded-Pacheco, warm complex, 0 to 2 percent slopes
1103	Urban land-Aquic Xerorthents-Xerorthents, dredged spoil complex, 0 to 2 percent slopes
1138	Urban land-Azuvina-Montebello complex, 0 to 5 percent slopes
1249	Urban land-Balcom-Typic Xerorthents, landscaped complex, 10 to 60 percent slopes
1137	Urban land-Ballona-Typic Xerorthents, fine substratum complex, 0 to 5 percent slopes
1005	Urban land-Biscailuz-Hueneme, drained complex, 0 to 2 percent slopes
1007	Urban land-Biscailuz-Pico complex, 0 to 2 percent slopes
1013	Urban land-Centinela-Typic Xerorthents, fine substratum complex, 0 to 2 percent slopes
1267	Urban land-Cumulic Haploxerolls complex, 2 to 9 percent slopes
1240	Urban land-Dapplegray complex, 5 to 20 percent slopes
1271	Urban land-Dapplegray complex, 5 to 20 percent slopes, terraced
1176	Urban land-Dapplegray-Filiorum, deep complex, 5 to 15 percent slopes
1173	Urban land-Dapplegray-Oceanaire complex, 10 to 35 percent slopes
1242	Urban land-Dapplegray-Soper complex, 20 to 55 percent slopes
1171	Urban land-Dapplegray-Vertic Calcixerolls complex, 3 to 12 percent slopes
1175	Urban land-Filiorum complex, 2 to 9 percent slopes
1129	Urban land-Grommet-Ballona complex, 0 to 5 percent slopes
1126	Urban land-Haploxeralfs complex, 0 to 2 percent slopes
1000	Urban land-Hueneme, drained-San Emigdio complex, 0 to 2 percent slopes
1154	Urban land-Marina complex, 0 to 5 percent slopes
1001	Urban land-Metz-Pico complex, 0 to 2 percent slopes
1238	Urban land-Montebello complex, 0 to 5 percent slopes
1210	Urban land-Montebello-Xerorthents complex, 0 to 15 percent slopes, terraced
1002	Urban land-Palmview-Tujunga complex, 0 to 5 percent slopes
1003	Urban land-Palmview-Tujunga, gravelly complex, 2 to 9 percent slopes
1008	Urban land-Pico-Metz complex, 0 to 2 percent slopes
1122	Urban land-Pierview complex, 0 to 5 percent slopes
1221	Urban land-Sepulveda complex, 2 to 12 percent slopes
1119	Urban land-Sepulveda-Longshore, graded complex, 3 to 12 percent slopes
1121	Urban land-Sepulveda-Pierview complex, 2 to 12 percent slopes
1006	Urban land-Soboba complex, 0 to 5 percent slopes
1011	Urban land-Soboba-Tujunga complex, 5 to 15 percent slopes

Map symbol	Map unit name
1136	Urban land-Sorrento-Arbolado complex, 2 to 9 percent slopes
1134	Urban land-Thums-Pierview complex, 0 to 5 percent slopes
1133	Urban land-Thums-Windfetch complex, 0 to 2 percent slopes
1132	Urban land-Thums-Windfetch complex, 0 to 5 percent slopes
1012	Urban land-Tujunga-Typic Xerorthents, sandy substratum complex, 0 to 2 percent slopes
1270	Urban land-Typic Xerorthents, calcareous complex, 0 to 5 percent slopes
1205	Urban land-Typic Xerorthents, calcareous substratum, 0 to 5 percent slopes
1131	Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 0 to 5 percent slopes
1135	Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 5 to 15 percent slopes
1235	Urban land-Typic Xerorthents, coarse-Vista complex, 10 to 35 percent slopes
1231	Urban land-Typic Xerorthents, dredged spoil complex, 0 to 2 percent slopes
1218	Urban land-Typic Xerorthents, terraced complex, 10 to 35 percent slopes
1125	Urban land-Typic Xerorthents, terraced-Windfetch complex, 2 to 9 percent slopes
1124	Urban land-Windfetch-Centinela complex, 0 to 5 percent slopes
1170	Urban land-Windfetch-Sepulveda complex, 2 to 9 percent slopes
1130	Urban land-Windfetch-Typic Haploxerolls complex, 0 to 2 percent slopes
250sm	Urban land-Xerorthents, landscaped complex, 0 to 5 percent slopes
252sm	Urban land-Xerorthents, landscaped, complex, rarely flooded, 0 to 5 percent slopes
1139	Urban land-Xerorthents, terraced-Centinela complex, 2 to 9 percent slopes
1163	Urban land-Xerorthents-Osito complex, 10 to 35 percent slopes
1147	Vista-Cieneba complex, 30 to 85 percent slopes
1148	Vista-Fallbrook-Cieneba complex, 30 to 75 percent slopes
320af	Vista-Trigo, granitic substratum-Modesto families complex, 40 to 70 percent slopes
W	Water
1264	Xeropsamments, frequently flooded, 0 to 2 percent slopes
1141	Zaca-Apollo, warm complex, 20 to 55 percent slopes
1179	Zaca-Ballast complex, 10 to 50 percent slopes

(14b) Legend of Map Units in Numerical Sequence with National Symbol

CA696 Los Angeles County, California, Southeastern Part:
Detailed Soil Map Legend

NUMERICAL LEGEND

Map symbol	National Symbol	Map unit name
12af	hm6l	Mollic Haploxeralfs, 2 to 50 percent slopes
24af	hm6q	Modesto, moderately deep-Trigo families complex, 25 to 75 percent slopes
36af	hm74	Trigo, granitic substratum-Exchequer families-Rock outcrop complex, 60 to 100 percent slopes
48af	hm7g	Trigo-Modesto-San Andreas families association, 15 to 70 percent slopes
54af	hm7j	Caperton-Trigo, granitic substratum-Lodo families complex, 50 to 85 percent slopes
92af	hm8l	Tollhouse-Stukel-Wrentham families complex, 60 to 90 percent slopes
100oc	hcl7	Alo clay, 9 to 15 percent slopes
106oc	hclf	Anaheim loam, 15 to 30 percent slopes
107oc	hclg	Anaheim loam, 30 to 50 percent slopes
107sf	h9hz	Capistrano-Urban land complex, 0 to 2 percent slopes
108sf	h9j0	Capistrano-Urban land complex, 2 to 9 percent slopes
109oc	hclj	Anaheim clay loam, 30 to 50 percent slopes
109sf	h9j1	Chualar-Urban land complex, 2 to 9 percent slopes
110sf	h9j2	Conejo-Urban land complex, 0 to 2 percent slopes
111sf	h9j3	Conejo-Urban land complex, 2 to 9 percent slopes
112oc	hclm	Balcom clay loam, 15 to 30 percent slopes
119oc	hclv	Blasingame-Rock outcrop complex, 9 to 30 percent slopes
120sm	hs0t	Mipolomol-Topanga association, 30 to 75 percent slopes
123oc	hclz	Bolsa silt loam, drained
123sf	h9jh	Mocho-Urban land complex, 0 to 2 percent slopes
124sf	h9jj	Mocho-Urban land complex, 2 to 9 percent slopes
125oc	hcm1	Bolsa silty clay loam, drained
127sf	h9jm	San Emigdio-Urban land complex, 0 to 2 percent slopes
132sf	h9js	Soper gravelly sandy loam, 15 to 30 percent slopes
134oc	hcmb	Calleguas clay loam, 50 to 75 percent slopes, eroded
140oc	hcmj	Chino silty clay loam, drained
164oc	hcn9	Metz loamy sand, moderately fine substratum
166oc	2tyyv	Mocho loam, 0 to 2 percent slopes, warm MAAT, MLRA 19
167oc	hcnd	Mocho loam, 2 to 9 percent slopes
173oc	hcnl	Myford sandy loam, 2 to 9 percent slopes
174oc	hcnm	Myford sandy loam, 2 to 9 percent slopes, eroded
177oc	hcnq	Myford sandy loam, 9 to 30 percent slopes, eroded
180oc	2tb94	Nacimiento clay loam, 15 to 30 percent slopes, MLRA 20, warm MAAT
181oc	2tb96	Nacimiento clay loam, 30 to 50 percent slopes, MLRA 20, warm MAAT
191oc	hcp5	Riverwash
195oc	hcp9	San Emigdio fine sandy loam, 2 to 9 percent slopes
207oc	2tz0c	Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19
209oc	2tz07	Sorrento clay loam, 2 to 9 percent slopes, warm MAAT, MLRA 19
250sm	hs1n	Urban land-Xerorthents, landscaped complex, 0 to 5 percent slopes
252sm	n9m1	Urban land-Xerorthents, landscaped, complex, rarely flooded, 0 to 5 percent slopes

Map symbol	National Symbol	Map unit name
290sm	hrwl	Topanga-Mipolomol-Sapwi association, 30 to 75 percent slopes
300af	hm6t	Trigo, granitic substratum-Modjeska families association, 5 to 60 percent slopes
313af	hm6x	Trigo family, granitic substratum, 60 to 90 percent slopes
314af	hm6y	Chilao-Trigo, granitic substratum-Lodo families complex, 55 to 85 percent slopes
316af	hm6z	Rock outcrop-Chilao family-Haploxerolls, warm association, 15 to 120 percent slopes
320af	hm70	Vista-Trigo, granitic substratum-Modesto families complex, 40 to 70 percent slopes
333af	hm72	Typic Xerorthents, warm, 55 to 90 percent slopes
420af	hm79	Olete-Kilburn-Etsel families complex, 50 to 80 percent slopes
450sm	hs1x	Sapwi loam, 30 to 75 percent slopes
1000	2lts5	Urban land-Hueneme, drained-San Emigdio complex, 0 to 2 percent slopes
1001	2mytv	Urban land-Metz-Pico complex, 0 to 2 percent slopes
1002	2pt3t	Urban land-Palmview-Tujunga complex, 0 to 5 percent slopes
1003	2qds7	Urban land-Palmview-Tujunga, gravelly complex, 2 to 9 percent slopes
1005	2nbzh	Urban land-Biscailuz-Hueneme, drained complex, 0 to 2 percent slopes
1006	2pt3v	Urban land-Soboba complex, 0 to 5 percent slopes
1007	2qds9	Urban land-Biscailuz-Pico complex, 0 to 2 percent slopes
1008	2qdsb	Urban land-Pico-Metz complex, 0 to 2 percent slopes
1010	2pt3w	Cropley-Urban land complex, 0 to 5 percent slopes
1011	2rshn	Urban land-Soboba-Tujunga complex, 5 to 15 percent slopes
1012	2rshr	Urban land-Tujunga-Typic Xerorthents, sandy substratum complex, 0 to 2 percent slopes
1013	2tb9h	Urban land-Centinela-Typic Xerorthents, fine substratum complex, 0 to 2 percent slopes
1014	2w612	Urban land-Aquic Xerorthents, fine substratum-Cropley complex, 0 to 5 percent slopes
1100	2lts6	Urban land, 0 to 2 percent slopes, dredged fill substratum
1103	2n8qs	Urban land-Aquic Xerorthents-Xerorthents, dredged spoil complex, 0 to 2 percent slopes
1104	2tb9c	Urban land-Aquic Xerorthents, graded-Pacheco, warm complex, 0 to 2 percent slopes
1106	2rshq	Urban land, commercial-Soboba complex, 0 to 5 percent slopes
1118	2w613	Longshore-Pachic Haploxerolls complex, 20 to 55 percent slopes
1119	2w614	Urban land-Sepulveda-Longshore, graded complex, 3 to 12 percent slopes
1120	2myty	Typic Xerorthents, terraced-Topanga-Urban land complex, 20 to 75 percent slopes
1121	2tb88	Urban land-Sepulveda-Pierview complex, 2 to 12 percent slopes
1122	2tb89	Urban land-Pierview complex, 0 to 5 percent slopes

Map symbol	National Symbol	Map unit name
1124	2tb9b	Urban land-Windfetch-Centinela complex, 0 to 5 percent slopes
1125	2w615	Urban land-Typic Xerorthents, terraced-Windfetch complex, 2 to 9 percent slopes
1126	2w61m	Urban land-Haploxeralfs complex, 0 to 2 percent slopes
1128	2tb8c	Urban land-Anthraltic Xerorthents, loamy substratum-Grommet complex, 0 to 5 percent slopes
1129	2sthw	Urban land-Grommet-Ballona complex, 0 to 5 percent slopes
1130	2mytz	Urban land-Windfetch-Typic Haploxerolls complex, 0 to 2 percent slopes
1131	2myv0	Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 0 to 5 percent slopes
1132	2myv1	Urban land-Thums-Windfetch complex, 0 to 5 percent slopes
1133	2p662	Urban land-Thums-Windfetch complex, 0 to 2 percent slopes
1134	2p663	Urban land-Thums-Pierview complex, 0 to 5 percent slopes
1135	2p6x4	Urban land-Typic Xerorthents, coarse substratum-Typic Haploxeralfs complex, 5 to 15 percent slopes
1136	2pt40	Urban land-Sorrento-Arbolado complex, 2 to 9 percent slopes
1137	2pt41	Urban land-Ballona-Typic Xerorthents, fine substratum complex, 0 to 5 percent slopes
1138	2pt42	Urban land-Azuvina-Montebello complex, 0 to 5 percent slopes
1139	2pt43	Urban land-Xerorthents, terraced-Centinela complex, 2 to 9 percent slopes
1140	2pt44	Apollo, warm-Calleguas complex, 20 to 65 percent slopes
1141	2pt45	Zaca-Apollo, warm complex, 20 to 55 percent slopes
1143	2pt47	Soper-Pachic Haploxerolls-Boades complex, 25 to 75 percent slopes
1144	2pt48	Soper-Buzzpeak association, 35 to 75 percent slopes
1145	2pt49	Gaviota-Chumash-Rock outcrop complex, 20 to 55 percent slopes
1146	2pt4b	Lithic Haploxerolls-Lithic Argixerolls complex, 20 to 55 percent slopes
1147	2rshj	Vista-Cieneba complex, 30 to 85 percent slopes
1148	2rshp	Vista-Fallbrook-Cieneba complex, 30 to 75 percent slopes
1149	2rshs	Balcom-Nacimiento, warm complex, 30 to 75 percent slopes
1150	2myv2	Abaft-Beaches complex, 0 to 5 percent slopes
1151	2myv4	Urban land-Abaft complex, 0 to 5 percent slopes
1152	2tb9d	Urban land-Abaft-Marina complex, 0 to 15 percent slopes
1153	2w60k	Urban land-Abaft, loamy surface complex, 5 to 30 percent slopes, terraced
1154	2w616	Urban land-Marina complex, 0 to 5 percent slopes
1155	2w62z	Beaches, rocky
1160	2qdsf	Padova-Walong complex, 30 to 85 percent slopes
1161	2stj5	Osito-Kawenga association, 20 to 65 percent slopes
1162	2stj6	Cotharin-Rock outcrop complex, 30 to 75 percent slopes
1163	2sx6h	Urban land-Xerorthents-Osito complex, 10 to 35 percent slopes

Map symbol	National Symbol	Map unit name
1164	2w62y	Anaheim-Soper complex, 20 to 55 percent slopes
1168	2w62h	Haploxerepts, 10 to 35 percent slopes
1169	2w62j	Lunada-San Benito, warm complex, 30 to 75 percent slopes
1170	2w61p	Urban land-Windfetch-Sepulveda complex, 2 to 9 percent slopes
1171	2w61q	Urban land-Dapplegray-Vertic Calcixerolls complex, 3 to 12 percent slopes
1172	2w61r	Lunada-Zaca complex, 30 to 75 percent slopes
1173	2w61s	Urban land-Dapplegray-Oceanaire complex, 10 to 35 percent slopes
1174	2w61t	Calcic Haploxerepts-Longshore-Urban land complex, 10 to 35 percent slopes
1175	2w61v	Urban land-Filiorum complex, 2 to 9 percent slopes
1176	2w61w	Urban land-Dapplegray-Filiorum, deep complex, 5 to 15 percent slopes
1177	2w61x	Mollic Haploxeralfs-Topdeck-Urban land complex, 20 to 55 percent slopes
1178	2w61y	Oceanaire-Filiorum complex, 10 to 35 percent slopes
1179	2w61z	Zaca-Ballast complex, 10 to 50 percent slopes
1180	2lts9	Pits and Quarries
1200	2sx6j	Urban land, commercial, 0 to 5 percent slopes
1201	2tb7k	Urban land, commercial, 5 to 35 percent slopes
1202	2w617	Urban land, 0 to 2 percent slopes
1205	2w620	Urban land-Typic Xerorthents, calcareous substratum, 0 to 5 percent slopes
1210	2qdsh	Urban land-Montebello-Xerorthents complex, 0 to 15 percent slopes, terraced
1218	2w618	Urban land-Typic Xerorthents, terraced complex, 10 to 35 percent slopes
1221	2tb8d	Urban land-Sepulveda complex, 2 to 12 percent slopes
1230	2myv5	Bolsa, drained-Typic Xerorthents, dredged spoil-Typic Fluvaquents complex, 0 to 2 percent slopes
1231	2pt4d	Urban land-Typic Xerorthents, dredged spoil complex, 0 to 2 percent slopes
1232	2pt4f	Counterfeit-Urban land complex, 10 to 35 percent slopes, terraced
1233	2w621	Typic Fluvaquents-Typic Xerorthents, dredged spoil complex, 0 to 1 percent slopes
1235	2rshl	Urban land-Typic Xerorthents, coarse-Vista complex, 10 to 35 percent slopes
1238	2tb8g	Urban land-Montebello complex, 0 to 5 percent slopes
1240	2tb7w	Urban land-Dapplegray complex, 5 to 20 percent slopes
1241	2pt4h	Counterfeit-Nacimiento, warm-Urban land association, 20 to 55 percent slopes
1242	2tb7v	Urban land-Dapplegray-Soper complex, 20 to 55 percent slopes
1249	2sthx	Urban land-Balcom-Typic Xerorthents, landscaped complex, 10 to 60 percent slopes
1261	2myv7	Urban land, frequently flooded, 0 to 5 percent slopes
1264	2qdsk	Xeropsamments, frequently flooded, 0 to 2 percent slopes
1266	2rshk	Soboba and Tujunga soils, 0 to 5 percent slopes, frequently flooded
1267	2tb8h	Urban land-Cumulic Haploxerolls complex, 2 to 9 percent slopes

Map symbol	National Symbol	Map unit name
1270	2w622	Urban land-Typic Xerorthents, calcareous complex, 0 to 5 percent slopes
1271	2w623	Urban land-Dapplegray complex, 5 to 20 percent slopes, terraced
1272	2w624	Dapplegray-Urban land complex, 10 to 35 percent slopes, terraced
1273	2w625	Dapplegray-Urban land-Lunada complex, 20 to 55 percent slopes
1280	2pt4l	Dumps
9996	2w630	Rock outcrop, marine terrace escarpments
9997	2w60j	Mined land, oil wells
9999	2w60h	Urban land, industrial
CkCsb	hcjj	Chualar clay loam, 2 to 9 percent slopes
DAM	nmm7	Dams
FoFsb	hcjs	Fontana clay loam, 30 to 50 percent slopes
GaCsb	hcjw	Garretson very fine sandy loam, 2 to 9 percent slopes
Hrsb	hck6	Hilmar loamy fine sand
NaEsb	2tb97	Nacimiento clay loam, 9 to 30 percent slopes, MLRA 20, warm MAAT
SpCsb	hckv	Soboba stony loamy sand, 2 to 9 percent slopes
StBsb	hckz	Sorrento clay loam, 2 to 5 percent slopes
TuBsb	hcl1	Tujunga loamy sand, 0 to 5 percent slopes
W	2lts8	Water

(15) and (16) Sampled Pedons in the county and their correlation.

Missing data entries indicate work to be completed before publication of the soil survey data. This is the status of the sampled pedons at the time the Final Correlation was completed.

11/30/2012

Component Pedon Information

User Site ID	User Pedon ID	Sampled Name	Correlated Name	Current Taxon Name	Component Pedon Name	Pedon Type
S2013CA037001	S2013CA037001	CROPLEY	CROPLEY	CROPLEY		CORRELATES TO NAMED SOIL
S2013CA037002	S2013CA037002	ZACA	VERTIC CALCIXEROLLS	VERTIC CALCIXEROLLS		UNDEFINED OBSERVATION
S2013CA037003	S2013CA037003	PLAYORICO	SAN EMIGDIO	SAN EMIGDIO		CORRELATES TO NAMED SOIL
S2013CA037004	S2013CA037004	APOLLO		APOLLO		CORRELATES TO NAMED SOIL
S2013CA037005	S2013CA037005	PALMVIEW	PALMVIEW	PALMVIEW	PALMVIEW	OSD PEDON
S2013CA037006	S2013CA037006	PALMVIEW, GRADED	PALMVIEW, GRADED	PALMVIEW, GRADED		CORRELATES TO NAMED SOIL
S2013CA037007	S2013CA037007	TUJUNGA	TUJUNGA	TUJUNGA	XEROPSAMMENTS TUJUNGA	OSD PEDON
S2014CA037001	S2014CA037001	THUMS	SEPULVEDA	SEPULVEDA		CORRELATES TO NAMED SOIL
S2014CA037005	S2014CA037005	VERTIC HAPLOXEROLLS	BALLONA	BALLONA		TAXADJUNCT TO THE SERIES
S2014CA037003	S2014CA037003	BOTELLA	AZUVINA	AZUVINA	AZUVINA	OSD PEDON
S2014CA037002	S2014CA037002	BISCAILUZ	BISCAILUZ	BISCAILUZ		CORRELATES TO NAMED SOIL
S2014CA037004	S2014CA037004	MONTEBELLO	MONTEBELLO	MONTEBELLO		TAXADJUNCT TO THE SERIES
S2014CA037006	S2014CA037006	GROMMET	GROMMET	GROMMET		OSD PEDON
S2015CA037001	S2015CA037001	ANTHRALTIC XERORTHENTS	SEPULVEDA	SEPULVEDA		OSD PEDON
S2015CA037002	S2015CA037002	SORRENTO	SORRENTO	SORRENTO	SORRENTO	CORRELATES TO NAMED SOIL
S2015CA037003	S2015CA037003	WINDFETCH	WINDFETCH	WINDFETCH		OSD PEDON
S2015CA037004	S2015CA037004	MARINA	MARINA	MARINA		TUD PEDON

(17) Notes to Accompany the Classification and Correlation prepared by Randy Riddle

Notes to Accompany the Classification of the Soil:

Mapping procedures for the Los Angeles area.

Soils that have Human Altered / Human Transported (HAHT) materials to a depth greater than 50 cm and whose properties are dissimilar to the naturally occurring materials are considered Anthropogenic Soils (USDA-NRCS, 2012). New soil series were created to incorporate components with HAHT materials possessing reasonably predictable soil properties. This is partly due to standardized building practices adopted by developers over the years. If soil has less than 50 cm of disturbed/modified material, or the human-transported materials (HTM) at the surface is similar to natural soil conditions, then the soil is considered a variation of the natural soil component.

First, the landscape should be mapped as close to natural landscape units and breaks to capture the landform underlying the urban land. Effort should be made to achieve this standard. In places where mass grading has taken place and no historical evidence of the natural landform ends or begins, draw the line to the extent of the current reshaped landform. If a geology map or existing historical soil survey is available, use all resources to delineate the landforms properly.

Second, if necessary, the composition of the urban land component can be phased to reflect the differing nature of this highly impermeable component if absolutely needed. E.g. Residential areas have strongly contrasting runoff properties than commercial or industrial areas and this should be captured. These could include differences in impermeable materials used such as, roofing, asphalt, cement, hard packed gravel, densities, etc. By phasing the urban land component, there is more flexibility in the development of useful map units.

Third as a last resort, map polygons could follow land use patterns when a highly disturbed situation is present. Dumps, mines, debris basins, seaports and other highly disturbed landscapes can be delineated in this manner. Hillsides that have been leveled and sub-terraced for building or recreational footprints may also be delineated since a new anthropogenic landform now exists and differs from the adjacent naturally occurring landform (where present).

The Climate and Soil Climate Model

The Los Angeles area has a Mediterranean Climate that is typical for the type. The climate can be characterized by having warm dry summers and cool moist winters. The mean annual temperature near downtown Los Angeles is about 17 degrees C. A narrow band of ocean buffered temperatures along the coast average 16 degrees C. Portions of the San Gabriel Valley average 18 degrees C. The temperature difference throughout the survey area is subtle, but can be generalized by the cooler temperatures along the coast with marine fog and slightly warmer temperatures further inland.

Rainfall is the least in the coastal areas (320 mm) and increases heading inland or by gaining elevation. The Los Angeles and San Gabriel River Floodplains, in the area south of the Elysian, Repetto, Merced, and the Puente Hills averages 320-380 mm of rainfall. Areas north and east of these hills, average 380 to 520 mm of rainfall. The low hills and mountains (within the SSA) are generally 25 to 100 mm higher in rainfall proportionally to the adjacent coastal or alluvial plain. The San Rafael Hills and Verdugo Mountain average 520 to 635 mm. The foothill area of the San Gabriel Mountains and the La Crescentia valley having the most rainfall in the alluvial plain area with 480 to 630 mm of rainfall. The rainfall totals north of the survey areas in the San Gabriel Mountains increase in upwards of 1000 to 1300 mm near Mount Wilson and Mount Baldy.

All soil temperatures are classified as “thermic” in the LA SSA. The survey work was conducted during a period of extreme drought and consecutive years of “hottest on record” temperatures. The soil temperature data collected reflected this anomaly by suggesting warmer than normal soils and rendered some data as inconclusive. All soils with temperature data prior to the 2012 had thermic temperatures. Hyperthermic temperatures (22-25 degrees C) were recorded on a few south facing slopes in the Puente and Verdugo Hills area. For example, in the Puente Hills the 2011 data suggested in the upper thermic range, while in 2015 these temperatures rose well into the hyperthermic range. This was consistent in the San Jose and Verdugo Mountains. Reposing north facing slopes were consistently 4 to 6 degrees cooler during hot years. These temperatures did not increase significantly during the most recent streak of hot years. A long term soil temperature investigation on south facing hills in the MLRA 20 is needed to determine if hyperthermic temperature are normal, or just a result of recent warmer than average temperatures. All soils were correlated to the thermic soil temperature regime for this reason.

Coastal areas have soil temperatures recorded to be cooler than the inland areas. Soils were recorded between 16 to 18 degrees C in coastal or shady areas, and upwards of 19 degrees in bare, modified areas with human-transported materials. The exception being the coastal sand dunes which had a soil temperature around 21 degrees C. This higher temperature is interpreted as a result of the recent warm annual temperatures and a higher degree of heat transmission in sandy soils. Frequency of coastal marine fog during this period was also less than average which helps buffer the coastal temperatures in “normal” years. Delta mean annual summer and winter temperature in the coastal areas also averaged 6.5 to 8 degrees C, which narrowing escaped inclusion in the iso temperature regimes. The summer and winter temperatures are broader in inland areas which had a difference greater than 8 degrees C. Temperature data from an inland valley in the Ontario area was recorded as slightly warmer than the coastal soils (18 degrees C).

Soil Mapping Model and Correlation

The granitic San Gabriel Mountain are located at the northern margin of the Los Angeles soil survey area. The CA696 survey boundary extends approximately 1-2 miles up from the base of the foothills and terminates at the boundary with the Angeles Nation Forest

Survey. This boundary extends in this fashion for approximately 40 miles from the City of Claremont to the Hansen Dam. Mapping the lower slopes of the foothills has not practical given the high order of mapping at the join with Angeles National Forest as well as an unrepresentative mapping position to project into large polygons (1000+ acres in size) within the Angeles Forest survey. For this reason, in most cases the former Angeles National Forest was brought down into CA696 and extended to the base of the slopes originally mapped. Exceptions of new map units being set up on the San Gabriel foothills occur in the Claremont hills area where a new, moderately deep, highly weathered, fine-loamy soil was documented on lithic granite. The Padova Series was established to characterize this concept.

Moving southwest from the San Gabriel Mountains, the San Gabriel Valley, La Crescentia Valley, Pomona Valley, and San Fernando Valleys all make up a broad sequence of alluvial fans with mostly weakly and undeveloped soils weathered from granitic sources.

Justification for Higher Categories – *family leve*l and *taxon above family*

Only Major Components are listed; all justifications match the Component text – higher category text notes

Family level components – LA County, CA, SE Part (CA696)
Anthraltic Xerorthents, loamy substratum – no series fit; lack of acreage to set up a new soil series
Aquic Xerorthents - no series fit; lack of acreage to set up a new soil series
Aquic Xerorthents, graded – no series fit; lack of acreage to set up a new soil series
Aquic Xerorthents, fine substratum - no series fit; lack of acreage to set up a new soil series
Calcic Haploxerepts - no series fit; lack of acreage to set up a new soil series
Cumulic Haploxerolls - no series fit; lack of acreage to set up a new soil series
Lithic Argixerolls - no series fit; lack of acreage to set up a new soil series
Lithic Haploxerolls – no series fit; lack of acreage to set up a new soil series
Mollic Haploxeralfs - no series fit; lack of acreage to set up a new soil series; highly variable textures and unpredictable horizons sequences
Pachic Haploxerolls - no series fit; lack of acreage to set up a new soil series
Typic Fluvaquents - no series fit; lack of acreage to set up a new soil series
Typic Haploxeralfs - no series fit; lack of acreage to set up a new soil series
Typic Haploxerolls - no series fit; lack of acreage to set up a new soil series
Typic Fluvaquents - no series fit; lack of acreage to set up a new soil series
Typic Xerorthents, coarse substratum - no series fit; lack of acreage to set up a new soil series
Typic Xerorthents, dredged spoil - no series fit; lack of acreage to set up a new soil series
Typic Xerorthents, terraced - no series fit; lack of acreage to set up a new soil series

Typic Xerorthents, coarse substratum - no series fit; lack of acreage to set up a new soil series
Typic Xerorthents, fine substratum - no series fit; lack of acreage to set up a new soil series
Typic Xerorthents, coarse - no series fit; lack of acreage to set up a new soil series
Typic Xerorthents, sandy substratum - no series fit; lack of acreage to set up a new soil series
Typic Xerorthents, landscaped - no series fit; lack of acreage to set up a new soil series
Typic Xerorthents, calcareous - no series fit; lack of acreage to set up a new soil series
Vertic Calcixerolls - no series fit; lack of acreage to set up a new soil series

Join Components – Angeles National Forest (CA696)

Forest Service component naming convention from the 1970s used series names to represent a taxonomic family. This practice is considered inaccurate and misleading and is no longer used. There is no data available at this time to recorrelate all family series names used in Angeles Forest without proper field data in the form of future MLRA projects. The series family components joining with CA696 include the following:

Caperton family
Chilao family
Etsel family
Exchequer family
Haploxerolls
Kilburn family
Lodo family
Modesto family
Modjeska family
Olete family
San Andreas family
Stukel family
Tollhouse family
Trigo family
Vista family
Wrentham family

TAXON ABOVE FAMILY

Taxon above family – LA County, CA, SE Part (CA696)

Haploxeralfs – High variability of surface textures and thickness above the argillic. Some areas have HTM overlying a thin veneer of eolian sands, other areas have natural eolian sands over the argillic, and yet other areas have graded alluvium at the surface. The textures in the argillic are also variable and cross particle size class boundaries. This is a small acreage area and is best represented by acknowledging this variability as a higher category.

Haploxerepts – Landslide deposits with a high degree of variability in texture, horizons, depth to bedrock, and distribution of calcium carbonate.
Typic Xerorthents, terraced (1218, 1125) - These soils are formed in human-transported materials. Observed data in the field confirms highly variable soil properties that were unable to be clearly separated. The classification can't be narrowed down beyond the subgroup level. The soil composition is unpredictable in texture, depth, among other important soil properties.

Typic Xerorthents, calcareous substratum – These soils are formed in human-transported materials. Observed data in the field confirms highly variable soil properties that were unable to be clearly separated. The classification can't be narrowed down beyond the subgroup level. The soil composition is unpredictable in texture, rock fragment content, bulk density, among other important soil properties.

Xeropsamments – Higher category is proposed to characterize the sandy (sometimes cobbly) stratified sandy fluvial alluvium in the river bottoms in the greater Los Angeles area. Tujunga/Metz soil components can't be confirmed due to the mixed mineralogy in this system, so a higher category of Xeropsamments are being correlated. The Tujunga/Soboba catena is expected in the northern part of the LA/San Fernando valleys. Moving south, there is mixing with the sedimentary hills where the Metz/Corralitos/Cortina catena can be expected. This landscape can't be taken to the subgroup level because of uncertainty in the depth to water table. The earthen bottom sections of the Los Angeles River & San Gabriel Rivers (including tributaries) are lined with concrete in suitable areas, except where springs are present. There was fear that the concrete slabs would float from the subsurface water and cause damage to the infrastructure. These are short sections of the stream/river channels where access was never approved. One geotechnical report confirms the presence of sandy material with stratified layers of cobbles/stones.

Xerorthents – highly variable textures and unpredictable horizons sequences

Xerorthents, dredged spoil – These soils are formed in human-transported materials. Observed data in the field confirms highly variable soil properties that were unable to be clearly separated. The classification can't be narrowed down beyond the great group level. The soil composition is unpredictable in texture, rock fragment content, bulk density, among other important soil properties.

Xerorthents, terraced - Observation of human-transported materials were found to be inconsistent in texture with clay percentages ranging from 15 to up to 50 percent. Concentrations of calcium carbonate was also highly variable. Higher category is being used due to the unpredictable nature of the HTM in mapunit 1139. This is a reasonable concept for a mapunit set up on high clay soils with pockets of highly concentrated calcium carbonate. Soil amendments are be necessary for most land use applications on soils with the native properties.

Xerorthents, coarse fill - These soils are formed in human-transported materials. Observed data in the field confirms highly variable soil properties that were unable to be clearly separated. The classification can't be narrowed down beyond the great group level. The soil composition is unpredictable in texture, rock fragment content, bulk density, among other important soil properties.

Xerorthents, shallow - These soils are formed in human-transported materials. Observed data in the field confirms highly variable soil properties that were unable to be clearly separated. The classification can't be narrowed down beyond the great group level. The soil composition is unpredictable in texture, depth class, rock fragment content, bulk density, among other important soil properties.

Taxon above family – Joins
Join components were used at face value. There is no current dataset from the CA696 investigations adequate to recorrelate or update the component names for the join components. An MLRA update project is necessary to accomplish this.

Haploxerolls – Joinwork with Angeles National Forest (CA776). Historically mapped as “taxon above family and adequate data does not exist to update or recorrelate.

Mollic Haploxeralfs - Joinwork with Angeles National Forest (CA776). Historically mapped as “taxon above family and adequate data does not exist to update or recorrelate.

Typic Xerorthents, warm - Joinwork with Angeles National Forest (CA776). Historically mapped as “taxon above family and adequate data does not exist to update or recorrelate.

Typic Xerorthents, landscaped - Joinwork with Santa Monica Mountains (CA692). Historically mapped as “taxon above family and adequate data does not exist to update or recorrelate.

Xerorthents - Joinwork with Western San Fernando Valley (CA676). Historically mapped as “taxon above family and adequate data does not exist to update or recorrelate.

Use of Taxadjuncts

Major Components

LA County, CA, SE Part (CA696) taxadjunct:

Calleguas – soils were documented as having a cambic horizon which falls outside the normal classification of Typic Xerorthents.

Join components listed as taxadjuncts:

Sorrento – Joinwork with San Bernardino County (CA677). Historically mapped as a taxadjunct and adequate documentation does not exist to update or recorrelate.

Use of Phases and Map unit Naming Conventions (Major Components only)

Phase Names for Anthropogenic Soils in LA CA696

1. Loamy surface – loamy HTM overlying sandy eolian sands
2. Terraced – HTM on hillslope terraces on engineered slopes
3. calcareous substratum – HTM overlying fi-lo calcareous alluvium
4. Gravelly – 15-35 percent gravels in the profile
5. Loamy substratum – Human-altered materials overlying loamy subsurface (formerly the Grommet series pre-grading)
6. Dredged spoil – HTM from dredged channels
7. Calcareous – coarse-loamy HTM (FSL, L, SIL, etc.) with calcium carbonate
8. Dredged spoil – Human-transported materials from dredged source and have a Dredgic HAHT family class
9. Coarse – chewed up granitic, sandy hillslope terraced soils
10. Coarse substratum – sand or sandy loam alluvium below HTM
11. Coarse fill – graded eolian sands overlying Centinela clay in the Torrance/Hawthorne area
12. Fine substratum – fine-loamy human-transported materials overlying natural dark colored clays
13. Gravelly substratum – coarse loamy HTM overlying gravelly alluvium from granitic sources
14. Sandy substratum – coarse-loamy HTM overlying alluvium from granitic sources
15. Terraced – higher category (family level) human-transported materials on hillslope terraces
16. Warm – Central coast and bay area soils mapped in MLRA 19 are phased as warm due to subtle climate differences. Also a carryover phase term from join units in Angeles National Forest Soil Survey
17. Graded – human-transported materials greater than 50 cm thick; typically the entire profile
18. Shallow – shallow depth class
19. Rocky – rocky beaches
20. Residential – phase name for Urban land components (based on density and development type)
21. Marine terrace escarpments – Palos Verdes hills escarpment with rock outcrop
22. Landscaped – terraced landscapes from the Santa Monica Mountains Soil Survey area
23. Industrial – high density industrial Urban land (oil refineries, railroad areas, etc)
24. Commercial – high density commercial Urban land (warehouses, business districts, etc)
25. Frequently flooded – flooding frequency

26. Drained – historically wet soils that have been drained from pumping and sealing of drainage ways
27. Deep – depth class; 100 to 150 cm to bedrock
28. Eroded – carry over eroded phase from Orange County (CA678) join

(18) Classification of the Soils

CLASSIFICATION OF THE SOILS
Los Angeles County, California, Southeastern Part: Detailed Soil Map Legend

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See NASIS text notes for a description of those characteristics that are outside the range of the series). Multiple entries were necessary to identify various phases that increase the users understanding of the components and to facilitate joining with adjacent surveys which were of an older vintage and classified using previous versions of Taxonomy.

Soil name	Local Phase	Family or higher taxonomic class	musym
Abaft	---	Mixed, thermic Typic Xeropsamments	1130
---	---	---	1150
---	---	---	1151
---	---	---	1152
---	loamy surface	---	1152
---	loamy surface	---	1153
---	---	---	1153
---	---	---	1154
---	---	---	1155
Alo	---	Fine, smectitic, thermic Aridic Haploxererts	100oc
---	---	---	109oc
---	---	---	1139
---	---	---	1176
---	---	---	1242
---	---	---	180oc
---	---	---	181oc
---	---	---	FoFsb
---	clay	---	NaEsb
*Anacapa	---	Coarse-loamy, mixed, superactive, thermic Calcic Haploxerolls	107sf
*---	---	---	108sf
*---	---	---	123sf
*---	---	---	124sf
---	---	Coarse-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls	207oc
---	---	Coarse-loamy, superactive, thermic Calcic Pachic Haploxerolls	166oc
Anaheim	clay loam	Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls	100oc
---	clay loam	---	106oc
---	---	---	106oc
---	clay loam	---	107oc
---	---	---	107oc
---	---	---	109oc
---	---	---	1164
---	clay loam	---	134oc
---	clay loam	---	180oc
---	loam	---	180oc
---	---	---	181oc
Anthraltic Xerorthents	sandy substratum	Coarse-loamy, mixed, superactive, calcareous, thermic Anthraltic Xerorthents	1200
---	gravelly substratum	Coarse-loamy, mixed, superactive, nonacid, thermic Anthraltic Xerorthents	1267
---	loamy substratum	Fine-loamy, mixed, superactive, nonacid, thermic Anthraltic Xerorthents	1128
---	gravelly subsurface	Fine-loamy, spolic, mixed, superactive, nonacid, thermic Anthraltic Xerorthents	1122
---	---	Sandy, spolic, mixed, nonacid, thermic Anthraltic Xerorthents	1002
Apollo	warm	Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls	1140
---	warm	---	1141
---	warm	---	1143
---	warm	---	1232
---	warm	---	1241
Aquents	hydric	Aquents	109sf
---	hydric	---	110sf
---	hydric	---	111sf
---	hydric	---	123sf
---	hydric	---	CkCsb
---	hydric	---	GaCsb
Aquic Palexerolls	---	Fine, smectitic, thermic Aquic Palexerolls	1121
Aquic Xerofluvents	---	Coarse-loamy, mixed, superactive, thermic Aquic Xerofluvents	1266
Aquic Xerorthents	---	Coarse-loamy, mixed, superactive, calcareous, thermic Aquic Xerorthents	1103
---	fine substratum	Fine-loamy, spolic, mixed, superactive, calcareous, thermic Aquic Xerorthents	1014
---	graded	Fine-loamy, spolic, mixed, superactive, nonacid, thermic Aquic Xerorthents	1104
---	graded	---	1231
Arbolado	---	Fine, spolic, smectitic, thermic Entic Haploxerolls	1136
---	---	---	1137
---	---	---	1242
Arenic Epiaqualfs	---	Fine-loamy, mixed, superactive, thermic Arenic Epiaqualfs	1154
Azuvina	---	Fine-loamy, mixed, superactive, thermic Typic Argixerolls	1007
---	---	---	1136
---	---	---	1137
---	---	---	1138
---	---	---	1238

Classififcation of the soils - continued

Soil name	Local Phase	Family or higher taxonomic class	musym
Bakeoven family	-----	Loamy-skeletal, mixed, mesic Lithic Haploxerolls	92af
Balcom	clay loam	Fine-loamy, mixed, superactive, thermic Typic Calcixerepts	100oc
-----	-----	-----	112oc
-----	-----	-----	1141
-----	-----	-----	1149
-----	-----	-----	1232
-----	-----	-----	1240
-----	-----	-----	1249
-----	clay loam	-----	134oc
-----	-----	-----	180oc
Balder family	-----	Loamy, mixed, mesic Typic Haploxerolls	92af
Ballast	-----	Fine, smectitic, thermic Typic Calcixerolls	1179
Ballona	-----	Fine, smectitic, thermic Calcic Pachic Haploxerolls	1129
-----	-----	-----	1136
-----	-----	-----	1137
Biscailuz	-----	Fine-loamy, mixed, superactive, thermic Oxyaquic Haploxerolls	1005
-----	-----	-----	1007
Blasingame	-----	Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs	119oc
Boades	-----	Loamy, mixed, superactive, thermic, shallow Entic Haploxerolls	1141
-----	-----	-----	1143
-----	-----	-----	1144
-----	-----	-----	120sm
-----	-----	-----	1241
Bolsa	drained	Fine-silty, mixed, superactive, calcareous, thermic Aquic Xerofluvents	1005
-----	drained	-----	1230
-----	drained	-----	1231
-----	-----	-----	123oc
-----	sandy loam overwash	-----	123oc
-----	-----	-----	125oc
-----	silty clay loam	-----	140oc
-----	silt loam, drained	-----	166oc
Bosanko	clay	Fine, smectitic, thermic Aridic Haploxererts	100oc
-----	clay	-----	112oc
Botella	loam	Fine-loamy, mixed, superactive, thermic Pachic Argixerolls	167oc
-----	-----	-----	207oc
-----	-----	-----	209oc
Buzzpeak	-----	Sandy, mixed, thermic Typic Haploxerepts	1144
Calcic Argixerolls	-----	Fine-loamy, mixed, superactive, thermic Calcic Argixerolls	1169
-----	moderately deep	-----	1171
Calcic Haploxeralfs	-----	Fine, smectitic, thermic Calcic Haploxeralfs	1125
-----	-----	-----	1132
Calcic Haploxerepts	moderately deep	Calcic Haploxerepts	48af
-----	-----	Coarse-loamy, mixed, superactive, thermic Calcic Haploxerepts	1174
-----	very channery	Loamy-skeletal, araric, mixed, superactive, thermic Calcic Haploxerepts	1272
Calcic Haploxerolls	-----	Coarse-loamy, mixed, superactive, thermic Calcic Haploxerolls	1140
-----	gravelly substratum	Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls	1175
Calcic Pachic Haploxerolls	-----	Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls	1170
-----	deep	-----	1173
-----	moderately-deep	-----	1178
-----	moderately-deep	-----	1179
-----	deep	-----	1271
-----	deep	-----	1273
*Calleguas	-----	Loamy, mixed, superactive, calcareous, thermic, shallow Typic Haploxerepts	1145
-----	-----	Loamy, mixed, superactive, calcareous, thermic, shallow Typic Xerorthents	109oc
-----	-----	-----	112oc
-----	-----	-----	134oc
*-----	-----	Loamy, mixed, superactive, thermic, shallow Calcic Haploxerepts	1140
*-----	-----	-----	1143
Calleguas family	-----	Loamy, mixed, calcareous, thermic, shallow Typic Xerorthents	48af
Caperton family	-----	Loamy, mixed, thermic, shallow Entic Haploxerolls	36af
-----	-----	-----	48af
-----	-----	-----	54af
Capistrano	gravelly fine sandy loam	Coarse-loamy, mixed, superactive, thermic Entic Haploxerolls	107sf
-----	-----	-----	107sf
-----	-----	-----	108sf
-----	-----	-----	173oc
-----	-----	-----	195oc
Centinela	-----	Fine, smectitic, thermic Vertic Haploxerepts	1013
-----	-----	-----	1124
-----	-----	-----	1125
-----	-----	-----	1139
Chesterton	loamy sand	Fine, kaolinitic, thermic Abruptic Durixeralfs	173oc

Classiffcation of the soils - continued

Soil name	Local Phase	Family or higher taxonomic class	musym
Chilao family		Loamy-skeletal, mixed, nonacid, thermic, shallow Typic Xerorthents	300af
			314af
			316af
			36af
			54af
Chino	silty clay	Fine-loamy, mixed, superactive, thermic Aquic Haploxerolls	123oc
			125oc
			140oc
	drained		166oc
Chualar		Fine-loamy, mixed, superactive, thermic Typic Argixerolls	109sf
			CkCsb
Chumash		Loamy, mixed, superactive, nonacid, thermic, shallow Typic Xerorthents	1145
			1163
			1164
			1242
Cieneba	sandy loam		106oc
	sandy loam		107oc
	sandy loam		109oc
	sandy loam		112oc
			1147
			1148
	sandy loam		119oc
			1235
	sandy loam		134oc
	sandy loam		177oc
			180oc
Conejo		Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls	107sf
			108sf
			110sf
			111sf
			123sf
			124sf
Corralitos		Mixed, thermic Typic Xeropsamments	1001
			1144
	loamy sand		164oc
Cotharin		Loamy, smectitic, thermic, shallow Entic Haploxerolls	1161
			1162
Counterfeit		Fine, spolic, smectitic, calcareous, thermic Typic Xerorthents	1201
			1232
			1240
			1241
Cropley		Fine, smectitic, thermic Aridic Haploxererts	1010
			1014
			1129
			1137
Cumulic Haploxerolls		Fine-loamy, mixed, superactive, thermic Cumulic Haploxerolls	1267
Dapplegray		Fine-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents	1171
			1172
			1173
			1176
			1201
			1240
			1242
			1271
			1272
			1273
Delhi		Mixed, thermic Typic Xeropsamments	Hrsb
Elder	coastal	Coarse-loamy, mixed, superactive, thermic Cumulic Haploxerolls	1267
	coastal		252sm
Etsel family		Loamy-skeletal, mixed, nonacid, mesic Lithic Xerorthents	333af
			420af
Exchequer		Loamy, mixed, superactive, nonacid, thermic Lithic Xerorthents	1147
			1148
Exchequer family		Loamy, mixed, nonacid, thermic Lithic Xerorthents	316af
			333af
			36af
			54af
Fallbrook		Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs	1147
			1148
			1235
Filiorum		Fine, smectitic, thermic Aridic Haploxererts	1171
	deep		1173
			1175
	deep		1176
	deep		1178
Fluvaquentic Haploxerolls		Fine, smectitic, thermic Fluvaquentic Haploxerolls	1134
Fontana	clay loam	Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls	1145
			1164
			181oc
			FoFsb
	gullied		FoFsb
	clay loam		NaEsb

Classififcation of the soils - continued

Soil name	Local Phase	Family or higher taxonomic class	musym
Garey		Coarse-loamy, mixed, superactive, thermic Lamellic Haploxeralfs	1152
Garretson		Fine-loamy, mixed, active, nonacid, thermic Typic Xerorthents	207oc
			CkCsb
	cobbly		GaCsb
			GaCsb
	gravelly loamy coarse sand		GaCsb
	very fine sandy loam		StBsb
Gaviota		Loamy, mixed, superactive, nonacid, thermic Lithic Xerorthents	1145
			1249
			132sf
Gazos		Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls	1249
Green Bluff family		Coarse-loamy, mixed, mesic Typic Haploxerepts	333af
			420af
Grommet		Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls	1014
			1128
			1129
			1136
			1221
Hanford		Coarse-loamy, mixed, superactive, nonacid, thermic Typic Xerorthents	SpCsb
	sandy loam		TuBsb
Hanford family		Coarse-loamy, mixed, nonacid, thermic Typic Xerorthents	300af
			314af
			316af
			320af
			48af
			54af
Haploxeralfs		Haploxeralfs	1126
	shallow		333af
Haploxerepts		Haploxerepts	1168
			9996
Haploxerolls	warm	Haploxerolls	314af
	warm		316af
	warm		48af
Hilmar		Sandy over loamy, mixed, active, calcareous, thermic Aeric Halaquepts	Hrsb
Hueneme	drained	Coarse-loamy, mixed, superactive, calcareous, thermic Oxyaquic Xerofluvents	1000
	drained		1001
	drained		1005
	drained		1008
	drained		1103
	drained		1131
	drained		1200
	fine sandy loam		123oc
	fine sandy loam		125oc
	fine sandy loam		164oc
			166oc
Kawenga		Fine-loamy, mixed, superactive, thermic Pachic Argixerolls	1149
			1161
			450sm
Kayiwish		Fine, smectitic, superactive, thermic Leptic Haploxererts	1162
Kilburn family		Loamy-skeletal, mixed, mesic Typic Haploxerolls	420af
Linne		Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls	1174
Lithic Argixerolls		Loamy, mixed, superactive, thermic Lithic Argixerolls	1146
Lithic Calcixerepts		Loamy, mixed, superactive, thermic Lithic Calcixerepts	1271
Lithic Haploxerolls		Loamy, mixed, superactive, thermic Lithic Haploxerolls	1146
Lodo family		Loamy, mixed, thermic Lithic Haploxerolls	24af
			314af
			316af
			36af
			54af
	skeletal	Loamy-skeletal, mixed, thermic Lithic Haploxerolls	314af
Longshore		Fine-loamy, mixed, superactive, thermic Typic Argixerolls	1118
	graded		1119
			1174
			1218
Lunada		Loamy-skeletal, mixed, superactive, thermic Typic Calcixerepts	1168
	stony		1169
			1169
			1172
			1173
			1178
			1179
			1273
			9996
Marina		Mixed, thermic Lamellic Xeropsamments	1126
			1131
			1152
			1153
			1154

Classififcation of the soils - continued

Soil name	Local Phase	Family or higher taxonomic class	musym
Metz	-----	Sandy, mixed, thermic Typic Xerofluvents	1000
-----	-----	-----	1001
-----	-----	-----	1007
-----	-----	-----	1008
-----	-----	-----	1202
-----	loamy sand	-----	123oc
-----	loamy sand	-----	164oc
-----	-----	-----	164oc
Millsholm family	-----	Loamy, mixed, thermic Lithic Haploxerepts	24af
Mipolomol	-----	Loamy, mixed, superactive, thermic, shallow Entic Haploxerolls	1120
-----	-----	-----	120sm
-----	-----	-----	290sm
-----	-----	-----	450sm
Mocho	-----	Fine-loamy, mixed, superactive, thermic Fluventic Haploxerolls	107sf
-----	-----	-----	108sf
-----	-----	-----	110sf
-----	-----	-----	111sf
-----	-----	-----	123sf
-----	-----	-----	124sf
-----	loam	-----	140oc
-----	2 to 9 percent slopes	-----	166oc
-----	-----	-----	166oc
-----	-----	-----	167oc
-----	sandy loam	-----	167oc
-----	loam	-----	195oc
-----	-----	-----	207oc
-----	-----	-----	209oc
Modesto family	-----	Fine-loamy, mixed, thermic Mollic Haploxeralfs	12af
-----	moderately deep	-----	24af
-----	-----	-----	300af
-----	-----	-----	320af
-----	-----	-----	48af
Modjeska family	-----	Loamy-skeletal, mixed, thermic Typic Haploxerepts	316af
-----	-----	-----	320af
-----	-----	-----	36af
-----	-----	Loamy-skeletal, mixed, thermic Typic Xerochrepts	300af
Mollic Haploxeralfs	volcanic materials	Fine-loamy, mixed, superactive, thermic Mollic Haploxeralfs	1177
-----	-----	Mollic Haploxeralfs	12af
Montebello	-----	Fine-loamy, spolic, mixed, superactive, nonacid, thermic Typic Xerorthents	1134
-----	-----	-----	1138
-----	-----	-----	1210
-----	-----	-----	1238
Myford	-----	Fine-loamy, mixed, superactive, thermic Typic Palexeralfs	173oc
-----	thick surface	-----	173oc
-----	sandy loam	-----	174oc
-----	eroded	-----	174oc
-----	-----	-----	177oc
-----	sandy loam	-----	177oc
Nacimiento	clay loam	Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls	106oc
-----	clay loam	-----	107oc
-----	clay loam	-----	109oc
-----	warm	-----	1140
-----	warm	-----	1149
-----	warm	-----	1240
-----	warm	-----	1241
-----	warm	-----	1242
-----	warm	-----	1249
-----	-----	-----	180oc
-----	-----	-----	181oc
-----	-----	-----	NaEsb
Oceanaire	-----	Fine-loamy, mixed, superactive, thermic Calcic Haploxeralfs	1172
-----	-----	-----	1173
-----	-----	-----	1178
-----	-----	-----	1179
Olete family	-----	Loamy-skeletal, mixed, mesic Typic Haploxerepts	92af
-----	-----	Loamy-skeletal, mixed, mesic Typic Xerochrepts	333af
-----	-----	-----	420af
Omni	drained	Fine, smectitic, calcareous, thermic Fluvaquentic Endoaquolls	123oc
-----	clay	-----	125oc
-----	clay	-----	140oc
Osito	-----	Loamy, mixed, superactive, thermic, shallow Typic Haploxerepts	1161
-----	-----	-----	1163
Osito family	-----	Loamy, mixed, thermic, shallow Typic Haploxerepts	48af
Pacheco	warm	Fine-loamy, mixed, superactive, thermic Fluvaquentic Haploxerolls	1104

Classififcation of the soils - continued

Soil name	Local Phase	Family or higher taxonomic class	musym
Pachic Argixerolls	fine	Fine, smectitic, superactive, thermic Pachic Argixerolls	1138
	moderately well drained	Fine-loamy, mixed, superactive, thermic Pachic Argixerolls	1118
	moderately well drained		1164
	gravelly substratum		1221
	very moist	Pachic Argixerolls	120sm
	moist		120sm
			290sm
Pachic Calcixerolls		Fine-loamy, mixed, superactive, thermic Pachic Calcixerolls	1007
Pachic Haploxerolls		Coarse-loamy, mixed, superactive, thermic Pachic Haploxerolls	1118
			1119
			1143
			1218
Padova		Fine-loamy, mixed, superactive, thermic Mollic Haploxeralfs	1160
Palmview		Coarse-loamy, mixed, superactive, nonacid, thermic Typic Xerorthents	1002
			1003
			1006
			1011
			1012
			1106
			1138
			1210
Pico		Coarse-loamy, mixed, superactive, thermic Fluventic Haploxerolls	1000
			1001
			1005
			1007
			1008
			1129
			207oc
Pierview		Fine-loamy, mixed, superactive, thermic Haplic Palexeralfs	1121
			1122
			1128
			1134
			1221
			1238
Pismo family		Mixed, thermic, shallow Typic Xeropsamments	36af
			54af
Ramona		Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs	1128
			1134
			1210
			SpCsb
San Andreas	sandy loam	Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls	1145
San Andreas family		Coarse-loamy, mixed, thermic Typic Haploxerolls	320af
			48af
San Benito	warm	Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls	1169
San Emigdio		Coarse-loamy, mixed, superactive, calcareous, thermic Typic Xerofluvents	1000
			1001
			1002
			110sf
			111sf
			1130
			1137
			1200
	fine sandy loam		123oc
			123sf
			127sf
			164oc
			195oc
Sapwi		Fine-loamy, mixed, superactive, thermic Pachic Argixerolls	290sm
			450sm
Sepulveda		Fine-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents	1119
			1121
			1122
			1124
			1130
			1132
			1133
			1170
			1221
			1270
Shortcut family		Sandy-skeletal, mixed, thermic, shallow Typic Xerorthents	300af
			316af
			36af
Soboba		Sandy-skeletal, mixed, thermic Typic Xerofluvents	1003
			1006
			1011
			1106
			1266
			SpCsb

Classiffcation of the soils - continued

Soil name	Local Phase	Family or higher taxonomic class	musym
Soper		Fine-loamy, mixed, superactive, thermic Typic Argixerolls	1143
			1144
			1164
			1242
			132sf
Sorrento		Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls	1136
	clay loam		140oc
			166oc
	loam		167oc
	sandy loam		195oc
			207oc
	loam		209oc
			209oc
*	clay loam	Fine-loamy, mixed, superactive, thermic Typic Haploxerolls	CkCsb
*			StBsb
Stonyford family		Loamy, mixed, thermic Lithic Mollic Haploxeralfs	24af
Stukel family		Loamy, mixed, mesic Lithic Haploxerolls	92af
Sur family		Loamy-skeletal, mixed, mesic Entic Haploxerolls	420af
			92af
Talepop		Loamy, mixed, superactive, thermic, shallow Typic Argixerolls	1162
Thums		Fine, smectitic, thermic Calcic Pachic Argixerolls	1010
			1124
			1130
			1132
			1133
			1134
Tollhouse family		Loamy, mixed, mesic, shallow Entic Haploxerolls	92af
Tongva		Fine-loamy, mixed, superactive, thermic Pachic Argixerolls	1162
Topanga		Loamy, mixed, superactive, thermic, shallow Typic Argixerolls	1120
			1161
			120sm
			290sm
			450sm
Topdeck		Loamy, mixed, superactive, thermic Lithic Argixerolls	1177
Trigo family	moderately deep	Coarse-loamy, mixed, thermic Typic Xerorthents	313af
		Loamy, mixed, nonacid, thermic, shallow Typic Xerorthents	24af
	granitic substratum		300af
	granitic substratum		313af
	granitic substratum		314af
	granitic substratum		320af
			333af
	granitic substratum		36af
			48af
	granitic substratum		54af
Tujunga		Mixed, thermic Typic Xeropsamments	1002
	gravelly		1003
			1003
			1006
			1011
			1012
			1106
			1147
			1160
			1266
	loamy sand		Hrsb
	gravelly loamy sand		SpCsb
			TuBsb
	gravelly loamy sand		TuBsb
Typic Argiaquolls	drained	Fine, smectitic, thermic Typic Argiaquolls	1133
Typic Argixerolls	coarse	Coarse-loamy, mixed, superactive, thermic Typic Argixerolls	1118
	coarse		1119
	fine	Fine, smectitic, superactive, thermic Typic Argixerolls	1160
	very channery	Loamy-skeletal, mixed, thermic Typic Argixerolls	1172
		Typic Argixerolls	290sm
Typic Calcixerepts		Fine-loamy, mixed, superactive, thermic Typic Calcixerepts	1177
Typic Calcixerolls		Fine-loamy, mixed, superactive, thermic Typic Calcixerolls	1124
Typic Fluvaquents		Coarse-loamy, mixed, superactive, nonacid, thermic Typic Fluvaquents	1230
		Sandy over loamy, mixed, superactive, nonacid, thermic Typic Fluvaquents	1233
Typic Haploxeralfs		Coarse-loamy, mixed, superactive, thermic Typic Haploxeralfs	1131
			1135
	moderately deep	Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs	1163
		Typic Haploxeralfs	12af
			24af

Classiffcation of the soils - continued

Soil name	Local Phase	Family or higher taxonomic class	musym
Typic Haploxerepts-------	-----------------	Coarse-loamy, mixed, superactive, thermic Typic Haploxerepts--	1161
-------------------------	channery---------	Fine-loamy, mixed, superactive, thermic Typic Haploxerepts--	1172
Typic Haploxerolls-------	-----------------	Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls--	1124
-------------------------	-----------------	---	1130
-------------------------	graded-----------	Coarse-loamy, spolic, mixed, superactive, thermic Typic Haploxerolls--	1131
Typic Palexerolls--------	-----------------	Typic Palexerolls--	120sm
Typic Psammaquents-------	-----------------	Mixed, thermic Typic Psammaquents------------------------	1266
Typic Xeropsamments------	-----------------	Mixed, thermic Typic Xeropsamments-----------------------	1118
-------------------------	graded-----------	Spolic, mixed, thermic Typic Xeropsamments---------------	1135
-------------------------	fine substratum--	---	1154
-------------------------	wet substratum---	---	1154
Typic Xerorthents--------	dredged spoil----	Coarse-loamy, dredgic, mixed, superactive, nonacid, thermic Typic Xerorthents-------------------------------	1230
-------------------------	dredged spoil----	---	1231
-------------------------	dredged spoil----	---	1233
-------------------------	coarse fill surface---------	Coarse-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents-------------------------------	1013
-------------------------	gravelly substratum------	Coarse-loamy, spolic, mixed, superactive, nonacid, thermic Typic Xerorthents-------------------------------	1011
-------------------------	sandy substratum-	---	1012
-------------------------	terraced---------	---	1120
-------------------------	coarse substratum	---	1131
-------------------------	coarse substratum	---	1135
-------------------------	fine substratum--	---	1238
-------------------------	calcareous-------	---	1270
-------------------------	very gravelly----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid, thermic Typic Xerorthents---------	1006
-------------------------	artifacts--------	Fine-loamy, pauciartifactic, mixed, superactive, calcareous, thermic Typic Xerorthents-------------------	1175
-------------------------	fine substratum--	Fine-loamy, spolic, mixed, calcareous, thermic Typic Xerorthents--	1137
-------------------------	fine substratum--	Fine-loamy, spolic, mixed, superactive, calcareous, thermic Anthraltic Xerorthents--------------------------	1013
-------------------------	graded alluvium--	Fine-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents-------------------------------	1129
-------------------------	fill-------------	Fine-loamy, spolic, mixed, superactive, nonacid, thermic Oxyaquic Xerorthents-----------------------------------	1200
-------------------------	landscaped-------	Fine-loamy, spolic, mixed, superactive, nonacid, thermic Typic Xerorthents--------------------------------------	1249
-------------------------	Landscaped-------	---	250sm
-------------------------	Landscaped-------	---	252sm
-------------------------	coarse-----------	Sandy, spolic, mixed, nonacid, thermic Typic Xerorthents-	1235
-------------------------	terraced---------	Typic Xerorthents--	1125
-------------------------	terraced---------	---	1174
-------------------------	calcareous substratum------	---	1205
-------------------------	terraced---------	---	1218
-------------------------	warm-------------	---	333af
-------------------------	-----------------	---	36af
-------------------------	-----------------	---	48af
Vertic Calcixerolls------	-----------------	Fine, smectitic, thermic Vertic Calcixerolls-------------	1139
-------------------------	-----------------	---	1171
Vertic Haploxerepts------	-----------------	Fine, smectitic, thermic Vertic Haploxerepts-------------	1013
Vertic Haploxerolls------	-----------------	Fine, smectitic, thermic Vertic Haploxerolls-------------	1140
Vista--------------------	-----------------	Coarse-loamy, mixed, superactive, thermic Typic Haploxerepts--	1147
-------------------------	-----------------	---	1148
-------------------------	coarse sandy loam	---	119oc
-------------------------	-----------------	---	1235
Vista family-------------	-----------------	Coarse-loamy, mixed, thermic Typic Haploxerepts----------	12af
-------------------------	-----------------	---	24af
-------------------------	-----------------	---	300af
-------------------------	-----------------	---	313af
-------------------------	-----------------	---	316af
-------------------------	-----------------	---	320af
-------------------------	-----------------	---	48af
-------------------------	-----------------	---	54af
Walong-------------------	-----------------	Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls--	1160
Windfetch----------------	-----------------	Fine-loamy, mixed, superactive, thermic Calcic Argixerolls--	1124
-------------------------	-----------------	---	1125
-------------------------	-----------------	---	1130
-------------------------	-----------------	---	1132
-------------------------	-----------------	---	1133
-------------------------	-----------------	---	1170
Wrentham family----------	-----------------	Loamy-skeletal, mixed, mesic Pachic Haploxerolls---------	92af
Xeropsamments------------	-----------------	Xeropsamments--	1264

Classififcation of the soils - continued

Soil name	Local Phase	Family or higher taxonomic class	musym
Xerorthents		Xerorthents	1000
			1001
			1005
			1008
			107sf
			108sf
			109sf
			1100
	dredged spoil		1103
			110sf
			111sf
	terraced		1139
	shallow		1163
	coarse fill		1210
			123sf
			124sf
			127sf
Yorba	gravelly sandy loam	Loamy-skeletal, mixed, superactive, thermic Typic Haploxeralfs	173oc
	gravelly sandy loam		174oc
	cobbly sandy loam		177oc
Zaca		Fine, smectitic, thermic Vertic Haploxerolls	1141
			1146
			1149
			1172
			1179
			1232
			1241
			1273

CLASSIFICATION KEY

CLASSIFICATION KEY
Los Angeles County, California, Southeastern Part: Detailed Soil Map Legend

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

ORDER
Suborder
Great Group
Subgroup

==
ALFISOLS

Xeralfs

Durixeralfs

Abruptic Durixeralfs

Chesterton--------------------Fine, kaolinitic, thermic Abruptic Durixeralfs

Haploxeralfs

Haploxeralfs------------------Haploxeralfs

Typic Haploxeralfs

Typic Haploxeralfs------------Coarse-loamy, mixed, superactive, thermic Typic Haploxeralfs
Blasingame--------------------Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs
Fallbrook---------------------Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs
Ramona------------------------Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs
Typic Haploxeralfs------------Fine-loamy, mixed, superactive, thermic Typic Haploxeralfs
Yorba-------------------------Loamy-skeletal, mixed, superactive, thermic Typic Haploxeralfs
Typic Haploxeralfs------------Typic Haploxeralfs

Calcic Haploxeralfs

Calcic Haploxeralfs-----------Fine, smectitic, thermic Calcic Haploxeralfs
Oceanaire---------------------Fine-loamy, mixed, superactive, thermic Calcic Haploxeralfs

Lithic Mollic Haploxeralfs

Stonyford Family--------------Loamy, mixed, thermic Lithic Mollic Haploxeralfs

Mollic Haploxeralfs

Mollic Haploxeralfs-----------Fine-loamy, mixed, superactive, thermic Mollic Haploxeralfs
Padova------------------------Fine-loamy, mixed, superactive, thermic Mollic Haploxeralfs
Modesto Family----------------Fine-loamy, mixed, thermic Mollic Haploxeralfs
Mollic Haploxeralfs-----------Mollic Haploxeralfs

Lamellic Haploxeralfs

Garey-------------------------Coarse-loamy, mixed, superactive, thermic Lamellic Haploxeralfs

Palexeralfs

Typic Palexeralfs

Myford------------------------Fine-loamy, mixed, superactive, thermic Typic Palexeralfs

Haplic Palexeralfs

Pierview----------------------Fine-loamy, mixed, superactive, thermic Haplic Palexeralfs

Epiaqualfs

Arenic Epiaqualfs

Arenic Epiaqualfs-------------Fine-loamy, mixed, superactive, thermic Arenic Epiaqualfs
==

ENTISOLS

Aquents

Aquents-----------------------Aquents

Fluvaquents

Typic Fluvaquents

Typic Fluvaquents-------------Coarse-loamy, mixed, superactive, nonacid, thermic Typic Fluvaquents

Psammaquents

Typic Psammaquents

Typic Psammaquents------------Mixed, thermic Typic Psammaquents

Arents

Xerorthents

Typic Xerorthents

Typic Xerorthents-------------Fine-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents

Fluvents

Xerarents

Typic Xerofluvents

San Emigdio-------------------Coarse-loamy, mixed, superactive, calcareous, thermic Typic Xerofluvents

Xerofluvents

Metz--------------------------Sandy, mixed, thermic Typic Xerofluvents
Soboba------------------------Sandy-skeletal, mixed, thermic Typic Xerofluvents

Aquic Xerofluvents

Aquic Xerofluvents------------Coarse-loamy, mixed, superactive, thermic Aquic Xerofluvents
Bolsa-------------------------Fine-silty, mixed, superactive, calcareous, thermic Aquic Xerofluvents

Oxyaquic Xerofluvents

Hueneme-----------------------Coarse-loamy, mixed, superactive, calcareous, thermic Oxyaquic Xerofluvents

Orthents

Xerorthents

Xerorthents-------------------Xerorthents

Typic Xerorthents

Typic Xerorthents-------------Coarse-loamy, dredgic, mixed, superactive, nonacid, thermic Typic Xerorthents
Hanford Family----------------Coarse-loamy, mixed, nonacid, thermic Typic Xerorthents

Hanford-----------------------Coarse-loamy, mixed, superactive, nonacid, thermic Typic Xerorthents
Palmview----------------------Coarse-loamy, mixed, superactive, nonacid, thermic Typic Xerorthents
Trigo Family------------------Coarse-loamy, mixed, thermic Typic Xerorthents
Typic Xerorthents-------------Coarse-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents
Counterfeit-------------------Fine, spolic, smectitic, calcareous, thermic Typic Xerorthents
Typic Xerorthents-------------Fine-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid, thermic Typic Xerorthents
Garretson---------------------Fine-loamy, mixed, active, nonacid, thermic Typic Xerorthents
Typic Xerorthents-------------Fine-loamy, pauciartifactic, mixed, superactive, calcareous, thermic Typic Xerorthents
Dapplegray--------------------Fine-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents
Sepulveda---------------------Fine-loamy, spolic, mixed, superactive, calcareous, thermic Typic Xerorthents
Montebello--------------------Fine-loamy, spolic, mixed, superactive, nonacid, thermic Typic Xerorthents
Typic Xerorthents-------------Fine-loamy, spolic, mixed, superactive, nonacid, thermic Typic Xerorthents
Calleguas Family--------------Loamy, mixed, calcareous, thermic, shallow Typic Xerorthents
Trigo Family------------------Loamy, mixed, nonacid, thermic, shallow Typic Xerorthents
Calleguas---------------------Loamy, mixed, superactive, calcareous, thermic, shallow Typic Xerorthents
Chumash-----------------------Loamy, mixed, superactive, nonacid, thermic, shallow Typic Xerorthents
Cieneba-----------------------Loamy, mixed, superactive, nonacid, thermic, shallow Typic Xerorthents
Chilao Family-----------------Loamy-skeletal, mixed, nonacid, thermic, shallow Typic Xerorthents
Typic Xerorthents-------------Sandy, spolic, mixed, nonacid, thermic Typic Xerorthents
Shortcut Family---------------Sandy-skeletal, mixed, thermic, shallow Typic Xerorthents
Typic Xerorthents-------------Typic Xerorthents

Aquic Xerorthents

Aquic Xerorthents-------------Coarse-loamy, mixed, superactive, calcareous, thermic Aquic Xerorthents

Lithic Xerorthents

Exchequer Family--------------Loamy, mixed, nonacid, thermic Lithic Xerorthents
Exchequer---------------------Loamy, mixed, superactive, nonacid, thermic Lithic Xerorthents
Gaviota-----------------------Loamy, mixed, superactive, nonacid, thermic Lithic Xerorthents
Etsel Family------------------Loamy-skeletal, mixed, nonacid, mesic Lithic Xerorthents

Oxyaquic Xerorthents

Typic Xerorthents-------------Fine-loamy, spolic, mixed, superactive, nonacid, thermic Oxyaquic Xerorthents

Anthraltic Xerorthents

Anthraltic Xerorthents--------Coarse-loamy, mixed, superactive, calcareous, thermic Anthraltic Xerorthents
Cropley-----------------------Fine, smectitic, thermic Aridic Haploxererts
Anthraltic Xerorthents--------Fine-loamy, mixed, superactive, nonacid, thermic Anthraltic Xerorthents
Typic Xerorthents-------------Fine-loamy, spolic, mixed, superactive, calcareous, thermic Anthraltic Xerorthents
Anthraltic Xerorthents--------Fine-loamy, spolic, mixed, superactive, nonacid, thermic Anthraltic Xerorthents

Psamments

Xeropsamments

Xeropsamments-----------------Xeropsamments

Typic Xeropsamments

Abaft-------------------------Mixed, thermic Typic Xeropsamments
Corralitos--------------------Mixed, thermic Typic Xeropsamments
Delhi-------------------------Mixed, thermic Typic Xeropsamments
Tujunga-----------------------Mixed, thermic Typic Xeropsamments
Typic Xeropsamments-----------Mixed, thermic Typic Xeropsamments
Pismo Family------------------Mixed, thermic, shallow Typic Xeropsamments
Typic Xeropsamments-----------Spolic, mixed, thermic Typic Xeropsamments

Lamellic Xeropsamments

Marina------------------------Mixed, thermic Lamellic Xeropsamments

Orthels

Xerorthents

Xerorthents-------------------Xerorthents

Typic Xerorthents

Typic Xerorthents-------------Typic Xerorthents

Xerepts

Haploxerepts

Typic Haploxerepts

Typic Haploxerepts------------Coarse-loamy, mixed, superactive, thermic Typic Haploxerepts
===
INCEPTISOLS

Aquepts

Halaquepts

Aeric Halaquepts

Hilmar------------------------Sandy over loamy, mixed, active, calcareous, thermic Aeric Halaquepts

Ochrepts

Xerochrepts

Typic Xerochrepts

Olete Family------------------Loamy-skeletal, mixed, mesic Typic Xerochrepts
Modjeska Family---------------Loamy-skeletal, mixed, thermic Typic Xerochrepts

Xerepts

Calcixerepts

Lithic Calcixerepts

Lithic Calcixerepts-----------Loamy, mixed, superactive, thermic Lithic Calcixerepts

Typic Calcixerepts

Balcom------------------------Fine-loamy, mixed, superactive, thermic Typic Calcixerepts
Typic Calcixerepts------------Fine-loamy, mixed, superactive, thermic Typic Calcixerepts
Lunada------------------------Loamy-skeletal, mixed, superactive, thermic Typic Calcixerepts

Haploxerepts

Haploxerepts------------------Haploxerepts

Lithic Haploxerepts

Millsholm Family--------------Loamy, mixed, thermic Lithic Haploxerepts

Vertic Haploxerepts

Centinela---------------------Fine, smectitic, thermic Vertic Haploxerepts
Vertic Haploxerepts-----------Fine, smectitic, thermic Vertic Haploxerepts

Calcic Haploxerepts

Calcic Haploxerepts-----------Calcic Haploxerepts
*Calleguas---------------------Loamy, mixed, superactive, thermic, shallow Calcic Haploxerepts
Calcic Haploxerepts-----------Loamy-skeletal, araric, mixed, superactive, thermic Calcic Haploxerepts

Typic Haploxerepts

Green Bluff Family------------Coarse-loamy, mixed, mesic Typic Haploxerepts
Vista------------------------Coarse-loamy, mixed, superactive, thermic Typic Haploxerepts
Vista Family------------------Coarse-loamy, mixed, thermic Typic Haploxerepts
Typic Haploxerepts------------Fine-loamy, mixed, superactive, thermic Typic Haploxerepts
*Calleguas---------------------Loamy, mixed, superactive, calcareous, thermic, shallow Typic Haploxerepts
Osito------------------------Loamy, mixed, superactive, thermic, shallow Typic Haploxerepts
Osito Family------------------Loamy, mixed, thermic, shallow Typic Haploxerepts
Olete Family------------------Loamy-skeletal, mixed, mesic Typic Haploxerepts
Modjeska Family---------------Loamy-skeletal, mixed, thermic Typic Haploxerepts
Buzzpeak----------------------Sandy, mixed, thermic Typic Haploxerepts
==

MOLLISOLS

Aquolls

Argiaquolls

Typic Argiaquolls

Typic Argiaquolls-------------Fine, smectitic, thermic Typic Argiaquolls

Endoaquolls

Fluvaquentic Endoaquolls

Omni--------------------------Fine, smectitic, calcareous, thermic Fluvaquentic Endoaquolls

Xerolls

Argixerolls

Typic Argixerolls

Typic Argixerolls-------------Coarse-loamy, mixed, superactive, thermic Typic Argixerolls
Azuvina-----------------------Fine-loamy, mixed, superactive, thermic Typic Argixerolls
Chualar-----------------------Fine-loamy, mixed, superactive, thermic Typic Argixerolls
Longshore---------------------Fine-loamy, mixed, superactive, thermic Typic Argixerolls
Soper-------------------------Fine-loamy, mixed, superactive, thermic Typic Argixerolls
Talepop-----------------------Loamy, mixed, superactive, thermic, shallow Typic Argixerolls
Topanga-----------------------Loamy, mixed, superactive, thermic, shallow Typic Argixerolls
Typic Argixerolls-------------Loamy-skeletal, mixed, thermic Typic Argixerolls

Calcic Pachic Argixerolls

Thums-------------------------Fine, smectitic, thermic Calcic Pachic Argixerolls

Calcic Argixerolls

Calcic Argixerolls------------Fine-loamy, mixed, superactive, thermic Calcic Argixerolls
Windfetch---------------------Fine-loamy, mixed, superactive, thermic Calcic Argixerolls

Lithic Argixerolls

Lithic Argixerolls------------Loamy, mixed, superactive, thermic Lithic Argixerolls
Topdeck-----------------------Loamy, mixed, superactive, thermic Lithic Argixerolls

Pachic Argixerolls

Pachic Argixerolls------------Fine, smectitic, superactive, thermic Pachic Argixerolls
Botella-----------------------Fine-loamy, mixed, superactive, thermic Pachic Argixerolls
Kawenga-----------------------Fine-loamy, mixed, superactive, thermic Pachic Argixerolls
Pachic Argixerolls------------Fine-loamy, mixed, superactive, thermic Pachic Argixerolls
Sapwi-------------------------Fine-loamy, mixed, superactive, thermic Pachic Argixerolls
Tongva------------------------Fine-loamy, mixed, superactive, thermic Pachic Argixerolls
Pachic Argixerolls------------Pachic Argixerolls

Calcixerolls

Typic Calcixerolls

Ballast-----------------------Fine, smectitic, thermic Typic Calcixerolls
Typic Calcixerolls------------Fine-loamy, mixed, superactive, thermic Typic Calcixerolls

Pachic Calcixerolls

Pachic Calcixerolls-----------Fine-loamy, mixed, superactive, thermic Pachic Calcixerolls

Vertic Calcixerolls

Vertic Calcixerolls-----------Fine, smectitic, thermic Vertic Calcixerolls

Haploxerolls

Haploxerolls------------------Haploxerolls

Oxyaquic Haploxerolls

Biscailuz---------------------Fine-loamy, mixed, superactive, thermic Oxyaquic Haploxerolls

Typic Haploxerolls

San Andreas-------------------Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls
Typic Haploxerolls------------Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls
Walong------------------------Coarse-loamy, mixed, superactive, thermic Typic Haploxerolls
San Andreas Family------------Coarse-loamy, mixed, thermic Typic Haploxerolls
Typic Haploxerolls------------Coarse-loamy, spolic, mixed, superactive, thermic Typic Haploxerolls
*Sorrento----------------------Fine-loamy, mixed, superactive, thermic Typic Haploxerolls
Balder Family-----------------Loamy, mixed, mesic Typic Haploxerolls
Kilburn Family----------------Loamy-skeletal, mixed, mesic Typic Haploxerolls

Aquic Haploxerolls

Chino-------------------------Fine-loamy, mixed, superactive, thermic Aquic Haploxerolls

Calcic Pachic Haploxerolls

Anacapa-----------------------Coarse-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls
Ballona-----------------------Fine, smectitic, thermic Calcic Pachic Haploxerolls
Calcic Pachic Haploxerolls----Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls
Linne-------------------------Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls
San Benito--------------------Fine-loamy, mixed, superactive, thermic Calcic Pachic Haploxerolls

Calcic Haploxerolls

*Anacapa-----------------------Coarse-loamy, mixed, superactive, thermic Calcic Haploxerolls
Calcic Haploxerolls-----------Coarse-loamy, mixed, superactive, thermic Calcic Haploxerolls
Apollo------------------------Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls
Calcic Haploxerolls-----------Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls
Fontana-----------------------Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls
Nacimiento--------------------Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls
Sorrento----------------------Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls

Cumulic Haploxerolls

Elder-------------------------Coarse-loamy, mixed, superactive, thermic Cumulic Haploxerolls
Cumulic Haploxerolls----------Fine-loamy, mixed, superactive, thermic Cumulic Haploxerolls

Entic Haploxerolls

Capistrano--------------------Coarse-loamy, mixed, superactive, thermic Entic Haploxerolls
Arbolado----------------------Fine, spolic, smectitic, thermic Entic Haploxerolls
Tollhouse Family--------------Loamy, mixed, mesic, shallow Entic Haploxerolls
Boades------------------------Loamy, mixed, superactive, thermic, shallow Entic Haploxerolls

Mipolomol---------------------Loamy, mixed, superactive, thermic, shallow Entic Haploxerolls
Caperton Family---------------Loamy, mixed, thermic, shallow Entic Haploxerolls
Cotharin----------------------Loamy, smectitic, thermic, shallow Entic Haploxerolls
Sur Family--------------------Loamy-skeletal, mixed, mesic Entic Haploxerolls

Fluvaquentic Haploxerolls

Fluvaquentic Haploxerolls-----Fine, smectitic, thermic Fluvaquentic Haploxerolls
Pacheco-----------------------Fine-loamy, mixed, superactive, thermic Fluvaquentic Haploxerolls

Fluventic Haploxerolls

Pico--------------------------Coarse-loamy, mixed, superactive, thermic Fluventic Haploxerolls
Mocho-------------------------Fine-loamy, mixed, superactive, thermic Fluventic Haploxerolls

Lithic Haploxerolls

Stukel Family-----------------Loamy, mixed, mesic Lithic Haploxerolls
Lithic Haploxerolls-----------Loamy, mixed, superactive, thermic Lithic Haploxerolls
Lodo Family-------------------Loamy, mixed, thermic Lithic Haploxerolls
Bakeoven Family---------------Loamy-skeletal, mixed, mesic Lithic Haploxerolls
Lodo Family-------------------Loamy-skeletal, mixed, thermic Lithic Haploxerolls

Pachic Haploxerolls

Pachic Haploxerolls-----------Coarse-loamy, mixed, superactive, thermic Pachic Haploxerolls
Anaheim-----------------------Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls
Conejo------------------------Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls
Gazos-------------------------Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls
Grommet-----------------------Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls
Wrentham Family---------------Loamy-skeletal, mixed, mesic Pachic Haploxerolls

Vertic Haploxerolls

Vertic Haploxerolls-----------Fine, smectitic, thermic Vertic Haploxerolls
Zaca--------------------------Fine, smectitic, thermic Vertic Haploxerolls

Palexerolls

Typic Palexerolls

Typic Palexerolls-------------Typic Palexerolls

Aquic Palexerolls

Aquic Palexerolls-------------Fine, smectitic, thermic Aquic Palexerolls
==

VERTISOLS

Xererts

Haploxererts

Aridic Haploxererts

Alo---------------------------Fine, smectitic, thermic Aridic Haploxererts
Bosanko-----------------------Fine, smectitic, thermic Aridic Haploxererts
Cropley-----------------------Fine, smectitic, thermic Aridic Haploxererts
Filiorum----------------------Fine, smectitic, thermic Aridic Haploxererts

Leptic Haploxererts

Kayiwish----------------------Fine, smectitic, superactive, thermic Leptic Haploxererts

(19) Join Statement

The Legend Text table of NASIS

Legend Text - All Notes
Los Angeles County, California, Southeastern Part: Detailed Soil Map Legend

Soil Survey Area	Text
ca676	Join to CA676 San Fernando Added to CA676: 1002la, 1003la, 1006la, 1010la, 1129la, 1180la, 1261la Added to CA696 from CA676: 107sf, 108sf, 109sf, 110sf, 111sf, 123sf, 124sf, 127sf, 132sf
ca678	Join to CA678 Orange County Added to CA678: 1000la, 1005la, 1009la, 1102la, 1134la, 1136la, 1137la, 1140la, 1141la, 1145la, 1230la, 1231la, 1232la, 1261la Added to CA678 from CA696: 100oc, 106oc, 107oc, 109oc, 112oc, 119oc, 123oc, 125oc, 140oc, 164oc, 166oc, 173oc, 174oc, 181oc, 191oc, 207oc, 209oc
ca776	Join to CA776 Angeles National Forest Added to CA776: 1002la, 1003la, 1011la, 1146la, 1160la, 1210la, 1266la, 1266la Added to CA696 from CA776 12af, 36af, 48af, 54af, 92af, 300af, 313af, 314af, 316af, 320af, 333af, 420af
ca677	Join to CA677 San Berardino Added to CA677: 1003la, 1007la, 1008la, 1109la, 1136la, 1140la, 1145la, 1180la, 1241la, 1266la Added to CA696 from CA677: CkCsb, F0Fsb, Hvsb, SpCsb, TuBsb
ca692	Join to CA692 Santa Monica Mountains National Recreation Area Added to CA692: 1001la, 1002la, 1003la, 1120la, 1121la, 1129la, 1150la, 1161la, 1221la, 1249la, 1261la, 1267ls Added to CA696 from CA692 120sm, 250sm, 252sm, 290sm, 450sm

(20) Signature Page

Christopher Paris Digitally signed by christopher paris
Date: 2016.06.27 15:55:17 -07'00'

Soil Data Quality Specialist Date
NRCS Pacific MLRA Soil Survey Region

CYNTHIA STILES Digitally signed by CYNTHIA STILES
DN: c=US, o=U.S. Government, ou=Department of Agriculture, cn=CYNTHIA STILES, 0.9.2342.19200300.100.1.1=12001000323131
Date: 2016.06.30 13:19:03 -07'00'

MLRA Team Leader Date
NRCS Pacific MLRA Soil Survey Region

GEORGE ROLFES Digitally signed by GEORGE ROLFES
DN: c=US, o=U.S. Government, ou=Department of Agriculture, cn=GEORGE ROLFES, 0.9.2342.19200300.100.1.1=12001000239782
Date: 2016.07.20 15:53:05 -07'00'

State Soil Scientist Date
NRCS California

Attachment 1
37 A will be added using adobe when creating the PDF file

NRCS-SOI-37a
REVISED MAY 2001

Soil Survey Area: **Los Angeles County, California, Southeast Part**

State: **CA696**

FEATURE AND SYMBOL LEGEND FOR SOIL SURVEY

U.S. DEPARTMENT OF AGRICULTURE

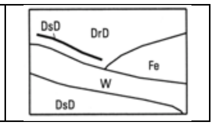
NATURAL RESOURCES CONSERVATION SERVICE

Date: May 2013

DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL

Features that are crossed out are not used in this survey.

SOIL SURVEY FEATURES

SOIL DELINEATIONS AND LABELS	

STANDARD LANDFORM AND MISCELLANEOUS SURFACE FEATURES (Features not used in CA60 crossed out)

Bedrock escarpment	
~~Non-bedrock escarpment~~	
~~Gully~~	
~~Levee~~	
~~Short steep slope~~	
~~Blowout~~	
~~Borrow pit~~	
~~Clay spot~~	
~~Closed depression~~	
~~Gravel pit~~	
~~Gravely spot~~	
~~Landfill~~	
~~Lava flow~~	
~~Marsh or swamp~~	
~~Mine or quarry~~	
~~Miscellaneous water~~	
~~Perennial water~~	
~~Rock outcrop~~	
~~Saline spot~~	
~~Sandy spot~~	
~~Severely eroded spot~~	
~~Sinkhole~~	
~~Slide or slip~~	
~~Sodic spot~~	
~~Spoil area~~	
~~Stony spot~~	
~~Very stony spot~~	
~~Wet spot~~	

AD HOC FEATURES
(NO Features used in CA605)

~~SFP~~	~~1~~	
	~~2~~	
	~~3~~	
~~DUR~~	4	
	~~5~~	
~~FUM~~	~~6~~	
	~~7~~	

	~~8~~	
	~~9~~	
	~~10~~	
	~~11~~	
	~~12~~	
~~BOM~~	~~13~~	
	~~14~~	
	~~15~~	
	~~16~~	
	~~7~~	
	18	
	~~19~~	
~~BCH~~	~~20~~	
	~~21~~	
	~~22~~	
	~~23~~	
	~~24~~	
	~~25~~	
~~SAS~~	~~26~~	
	~~27~~	
~~BLD~~	~~28~~	
	~~29~~	
~~SWA~~	~~30~~	
	~~31~~	
	~~32~~	
	~~33~~	
~~SER~~	~~34~~	
~~COB~~	~~35~~	
	~~36~~	
	~~37~~	
	~~38~~	
	~~39~~	
~~TER~~	~~40~~	
~~SDL~~	~~41~~	
~~DET~~	~~42~~	
~~KIP~~	~~43~~	
	44	

CULTURAL FEATURES (Optional)

National, state or providence	
County or parish	
County or parish	

Reservation (national or state forest or park)	
Limit of soil survey (label) and/or denied access area	
Field sheet matchline and neatline	
Public Land Survey System Section Boundary	
Public Land Survey System Section Corner Tics.	

TRANSPORTATION

Divided road Normally not shown	
Other road Normally not shown	
Trail Normally not shown	

ROAD EMBLEMS

Interstate	
Federal	
State	
County, farm or ranch	

LOCATED OBJECTS **(None used)**

~~Airport, airfield~~	
~~Cemetery~~	
~~Church~~	
~~Farmstead, house (omit in urban areas)~~	
~~Lighthouse~~	
~~Located object (Label)~~	Ranger Station
~~Lookout tower~~	
~~Oil and/or natural gas well~~	
~~Other Religion (label)~~	Mt. Carmel

NRCS-SOI-37a
REVISED MAY 2001

Soil Survey Area: **Los Angeles County, California, Southeast Part**

State: **CA696**

FEATURE AND SYMBOL LEGEND FOR SOIL SURVEY

U.S. DEPARTMENT OF AGRICULTURE

NATURAL RESOURCES CONSERVATION SERVICE

Date: May 2013

DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL

Features that are crossed out are not used in this survey.

~~School~~	
~~Soil sample site (compiled only not published)~~	
~~Tank (label)~~	~~Petroleum~~
~~Windmill~~	

HYDROGRAPHIC FEATURES (NOT USED)

~~Drainage end~~	

~~(indicates direction of flow)~~	
~~Perennial stream~~	
~~Intermittent stream~~	
~~Unclassified stream~~	
~~Perennial drainage or irrigation ditch~~	

~~Intermittent drainage or irrigation ditch~~	
~~Unclassified drainage or irrigation ditch~~	
~~Flood pool line~~	~~FLOOD POOL LINE~~
~~Spring~~	
~~Well, artesian~~	
~~Well, irrigation~~	

LABEL NAME DESCRIPTION

~~**BLO** .... Blowout ....A small saucer-, cup-, or trough-shaped hollow or depression formed by wind erosion on a preexisting sand deposit. Typically ____ to ____ acres.~~

~~**BPI**.......... Borrow pit........................An open excavation from which soil and underlying material have been removed usually for construction purposes. Typically ____ to ____ acres.~~

~~**CLA** .... Clay spot..........................A spot where the surface layer is silty clay or clay in areas where the surface layer of the named soils in the surrounding map unit is sandy loam, loam, silt loam, or coarser.~~

~~**DEP**......... Depression, closed ....A shallow, saucer-shaped area that is slightly lower on the landscape than the surrounding area and is without a natural outlet for surface drainage. Typically ____ to ____ acres.~~

~~**ESB** .... Escarpment, bedrock.........A relatively continuous and steep slope or cliff produced by erosion or faulting, which breaks the general continuity of more gently sloping land surfaces. Exposed material is hard or soft bedrock.~~

~~**ESO**......... Escarpment, other ....A relatively continuous and steep slope or cliff that generally is produced by erosion but can be produced by faulting, which breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow soil.~~

~~**GPI** .... Gravel pit ....An open excavation from which soil and underlying material have been removed and used, without crushing, as a sourve of sand or gravel. Typically 3 to 5 acres.~~

~~**GRA**........ Gravelly spot....................A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area of surrounding soil with less than 15 percent fragments. Typically 3 to 5 acres.~~

~~**GUL** .... Gully................................A small channel with steep sides cut by running water and through which water ordinarily runs only after a rain or after ice or snow melts. It generally is an obstacle to wheeled vehicles and is too deep to be obliterated by ordinary tillage.~~

~~**LDF**......... Landfill ....An area of accumulated waste products of human habitation that can be above or below natural ground level. Typically ____ to ____ acres.~~

~~**LAV** .... Lava flow.........................A solidified body of rock formed through lateral, surficial outpouring of molten lava from a vent or fissure. Often lobate in shape. Typically ____ to ____ acres.~~

~~**LVS**......... Levee ....An embankment that confines or controls water, especially one built along the banks of a river to prevent overflow on lowlands.~~

~~**MAR** .... Marsh or swamp ....A water-saturated, very poorly drained area, intermittently or permanently covered by water. Marsh areas are dominantly vegetated by sedges, cattails, and rushes. Swamps are dominantly vegetated by trees or shrubs. Not used in map units where poorly drained or very poorly drained soils are the named components. Typically 3 to 5 acres.~~

~~**MPI**......... Mine or quarry ....An open excavation from which soil and underlying material are removed and bedrock is exposed. Also denotes surface openings to underground mines. Typically 3 to 5 acres.~~

~~**MIS**......... Miscellaneous water ....Small, man-made water area that is used for industrial, sanitary, or mining applications and contains water most of the year. Typically ____ to ____ acres.~~

~~**WAT** .... Perennial water ....Small, natural or man-made lake, pond, or pit that contains water most of the year. Typically ______ to _____ acres.~~

NRCS-SOI-37a
REVISED MAY 2001

Soil Survey Area _
State _CA 696___________

FEATURE AND SYMBOL LEGEND FOR SOIL SURVEY

U.S. DEPARTMENT OF AGRICULTURE

NATURAL RESOURCES CONSERVATION SERVICE

Date: _Dec 2012_________

Features that are crossed out are not used in this survey

~~**ROC**........ Rock outcrop....................An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where "bedrock" is a named component of the map unit. Typically ___3 to 5 acres.~~

~~**SAL**......... Saline spot ....An area where the surface layer has an electrical conductivity of 8 mmhos cm-1 more than the surface layer of the named soils in the surrounding map unit, which have an EC of 2 mmhos cm-1 or less. Typically _____to acres.~~

~~**SAN**......... Sandy spot ....A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils of the surrounding map unit is very fine sandy loam or finer.~~

~~**ERO**........ Severely eroded spot.........An area where on the average 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units with component phases that are named severely eroded, very severely eroded, or gullied.~~

~~**SLP** .... Short, steep slope ....Narrow soil area that has slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.~~

~~**SNK** .... Sinkhole...........................A closed depression formed either by solution of the surficial rock or by collapse of underlying caves. Typically to acres.~~

~~**SLI** .... Slide or slip......................A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces. Typically 3 to ___5 acres.~~

~~**SOD** .... Sodic spot ....An area where the surface layer has a sodium adsorption ratio that is at least 10 more than the surface layer of the named soils in the surrounding map unit, which have a sodium adsorption ratio of 5 or less. Typically to acres.~~

~~**SPO**......... Spoil area.........................A pile of earthy materials, either smoothed or uneven, resulting from human activity. Typically______to _____acres.~~

~~**STN**......... Stony spot ....A spot where 0.01 to 0.1 percent of the surface is covered with rock fragments that are greater than 10 inches in diameter in areas where the surrounding soil has no surface stones. Typically______to _____acres.~~

~~**STV**......... Very stony spot ....A spot where 0.1 to 3 percent of the surface is covered with rock fragments that are greater than 10 inches in diameter in areas where less than 0.01 percent of the surface of the surrounding soil is covered with stones. Typically to acres.~~

~~**WET** .... Wet spot...........................A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit. Typically 3 to 5 acres.~~

AD HOC SYMBOLS

For

Pacific Southwest MLRA Region 2

04/01

LABEL NAME________DESCRIPTION____

~~**BCH** 20..Beaches........................A gently sloping zone, typically with a concave profile, of unconsolidated material extending landward from the low-water line to the place where there is a definite change in material or physiographic form (such as a cliff)~~

~~**BOM** 13 Bomb crater ....A bowl shaped hole in the ground between 10 to 25 feet in diameter and between 7 and 15 feet deep caused by aerial bombs or naval guns. Typically .05 to .10 acres.~~

~~**COB** 35 Cobbly spot..................Surface layer has more than 35 percent, by volume, of rock fragments 3 to 10 inches in diameter in areas where less than 0.01 percent of the surface of the surrounding soil is covered with cobbles. Typically 0 to 5 acres.~~

~~**DET** 42 .Detrimental deposits .....Areas of spreading or deposits of cement dust, cement, or other types of materials that, when on the surface, inhibit the growth of plants, and make classification of the underlying soil impractical. Typically 0 to 5 acres.~~

~~**DUR** 4...Duripan ....The duripan is a subsurface horizon that is cemented by illuvial silica to the degree that is less than 50 percent of the volume of air-dry fragments that slake in water or during prolonged soaking in acid (HCL). Typically 0 to 5 acres.~~

NRCS-SOI-37a
REVISED MAY 2001

Soil Survey Area: Humboldt Area, South Part

State: CA601

FEATURE AND SYMBOL LEGEND FOR SOIL SURVEY (Continued)

U.S. DEPARTMENT OF AGRICULTURE

NATURAL RESOURCES CONSERVATION SERVICE

Date: June 2004

~~**FUM** 6...Fumarole ....A volcanic vent emitting steam or gases, or any other localized expression of geothermal dynamisc. Typically 3 to .6 acres.~~

~~**KIP** 43 ..Kipuka...........................An island in the midst of a lava flow that escaped burial by the flowing lava because the lava was diverted around it. Typically .5 to 1.0 acres.~~

~~**SAS** 26 .Saline sodic spot...........Surface layer with a sodium adsorption ration that is 10 or more and an electical conductivity of 8 decisiemins more than the surface layer of the named soils in the surrounding map unit, which has a sodium adsorption ratio of 5 or less and which has and EC of 4 decisiemins/meter or less. Typically 0 to 5 acres.~~

~~**SDL** 41... Sandy loam surface...........A spot where the surface layer is sandy loam in areas where the surface layer of the named soils of the surrounding map unit is loamy fine sand or coarser. Typically 0 to 5 acres~~.

~~**SWA** 30 Seasonal water table ....A water table which has been altered by seepage from irrigation. Not used where the major components have the same characteristics. Typically 0 to 5 acres.~~

~~**SER** 34 .Serpentine outcrop........An exposure of serpentinitic bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock. Typically 0 to 5 acres.~~

~~**SFP** 1 ...Short, flat slope.............Narrow soil area that has slopes that are at leas 2 slope classes less than the slope class of the surrounding map unit. Typically 0 to 5 acres.~~

~~**TER** 40 .Terrace remnant ....A fan remnant or stream terrace that remains or is left standing above the general land surface after erosion has reduced the surrounding area. Typically 0 to 5 acres.~~

~~**BLD** 28 .Bouldery ....Bouldery surface. Surface with scattered boulders not usually founf deep into the soil. Typically 0 to 5 acres~~

Location and Reference Map for the Soil Survey of Los Angeles County, California, Southeastern Part